The Soils of The Regional Municipality of Niagara

Volume 1

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THE SOILS OF THE REGIONAL MUNICIPALITY OF NIAGARA

Volume 1

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by

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*The Ontario Institute of Pedology serves as a coordinating body between three member agencies working in the areas of soil inventory, interpretation and research. It is made up of components of the Land Resource Research Centre, Research Branch of Agriculture Canada, the Soil and Water Management Branch of the Ontario Ministry of Agriculture and Food, and the Department of Land Resource Science of the University of Guelph.

Land Resource Research Centre Contribution No. 89-17.

INTRODUCTION

The soil information that was compiled for the Niagara soil maps and report was collected during the resurveying of the former Counties of Lincoln and Welland. The original soil survey for Welland County was completed in 1935 and published at a scale of approximately 1:126,720 (1). The original Lincoln County soil survey was completed in 1963 and published at a scale of 1:63,360 (2).

The decision to resurvey Lincoln and Welland Counties, now combined into the Regional Municipality of Niagara, resulted from demands for better and more detailed soil information, particularly from regional planners. Hence, the resurvey was begun in 1980 and completed in 1987 at a more detailed scale of 1:25,000. Preliminary soil maps and interpretations, incorporating the new soil information, were made available during this time period.

The soil report consists of two volumes. Volume 1 contains an outline of the environmental setting of the soils, generalized descriptions of the soils, soil interpretations and an appendix containing some generalized analytical information for selected soils. Volume 2 contains detailed morphological, chemical and physical descriptions of typical soils, and in addition, tables of statistical means and engineering test data. In addition to the soil report, there are seven soil maps published at a scale of 1:25,000, and one soil map with generalized soil information at a scale of 1:100,000. The final soil report and maps replace all previously published soil survey information for the Region.

HOW TO USE THE SOIL REPORT AND MAPS

Resource managers, such as farmers, usually know the characteristics and variations of soils on their own properties or in the immediate vicinity. However, without a soil map or soil report, comparisons with other soils in the Region may be difficult. With the help of a soil map, regional similarities and differences between soils are apparent. Such information can be an aid in buying or renting land, or in transferring management techniques to similar soils, thereby reducing the risks of managing new land.

To use the soil report and maps most efficiently, the following steps are suggested:

1. Locate your area of interest on the key map (Figure 1). Note the number or name of the soil map on which your area of interest is located.
2. Obtain the appropriate 1:25,000 soil map and locate your site. Natural and cultural features on the map, such as streams, contours, roads, buildings, lot and concession numbers, should aid in locating the site.
3. Note the map unit symbols marked within the boundaries of the map unit delineation where your site is located. An explanation of how to interpret a map unit appears on all the soil maps under the heading "Key to the Map Unit Symbols".
4. Consult the legend on the map to help decipher the map unit symbol in your area of interest. The legend provides information on soil components, slopes, parent materials and drainages.
5. If more information is required on the soil components, it can be obtained from Volume 1 of the soil report, where a generalized description of each soil is presented, including comments on its variability and land use. Some generalized statistical information is also contained in the Appendix of Volume 1.
6. For detailed morphological, chemical and physical descriptions of typical soils, as well as tables of statistical means and engineering test data, users are referred to Volume 2 of the soil report.
7. For soil interpretations such as soil capability for common agricultural field crops, soil suitability for various field and horticultural crops and soil erosion interpretations, refer to Volume 1.
8. For generalized comparisons of relatively large soil areas, users are referred to the generalized Niagara soil map at a 1:100,000 scale. It is not advisable to use this map for information on areas smaller than 40 ha (100 ac).

Users should be aware that each soil exhibits a range of properties, and that boundaries between map units, even though they represent the best estimate of where the soils change, may only be approximately located. They should also be aware that there could be inclusions of unidentified soil components as large as a few hectares in area, within any map unit delineation. This is due to the map scale and the mapping methodology used. Most soil information is based on the examination of soil characteristics to a depth of about 1 m below the surface.

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Figure 1. Soil map index of the Regional Municipality of Niagara.

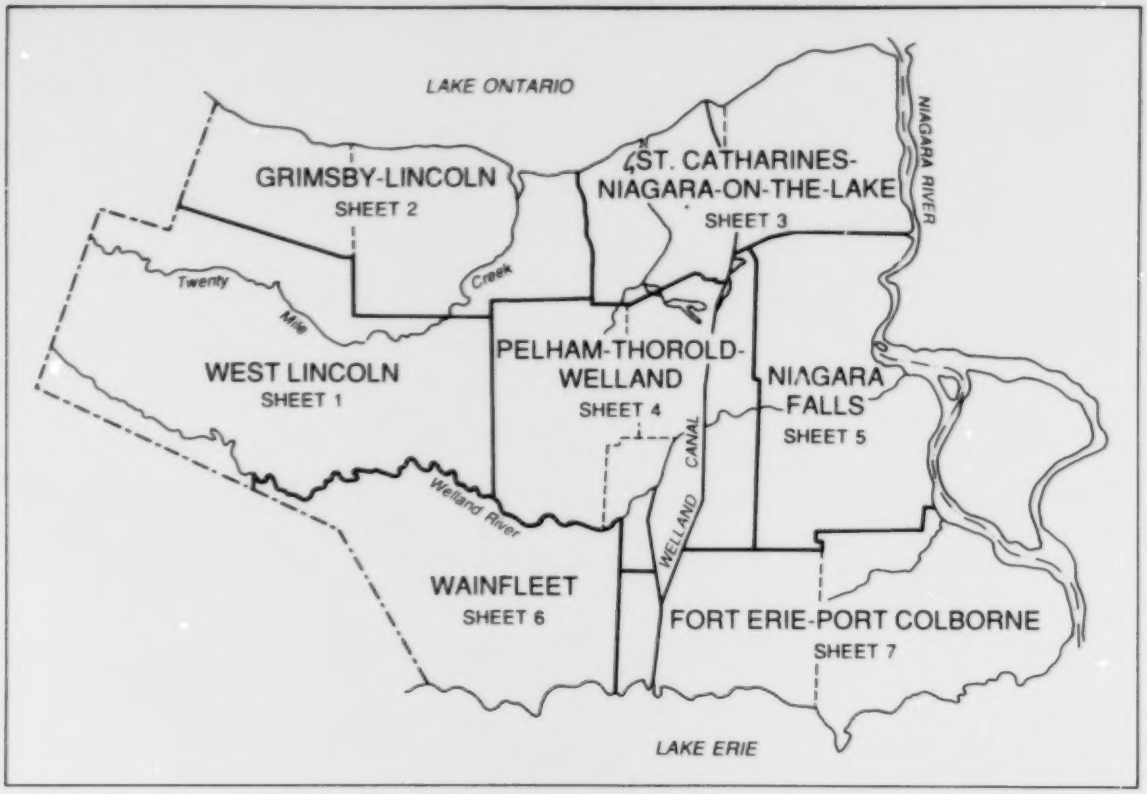
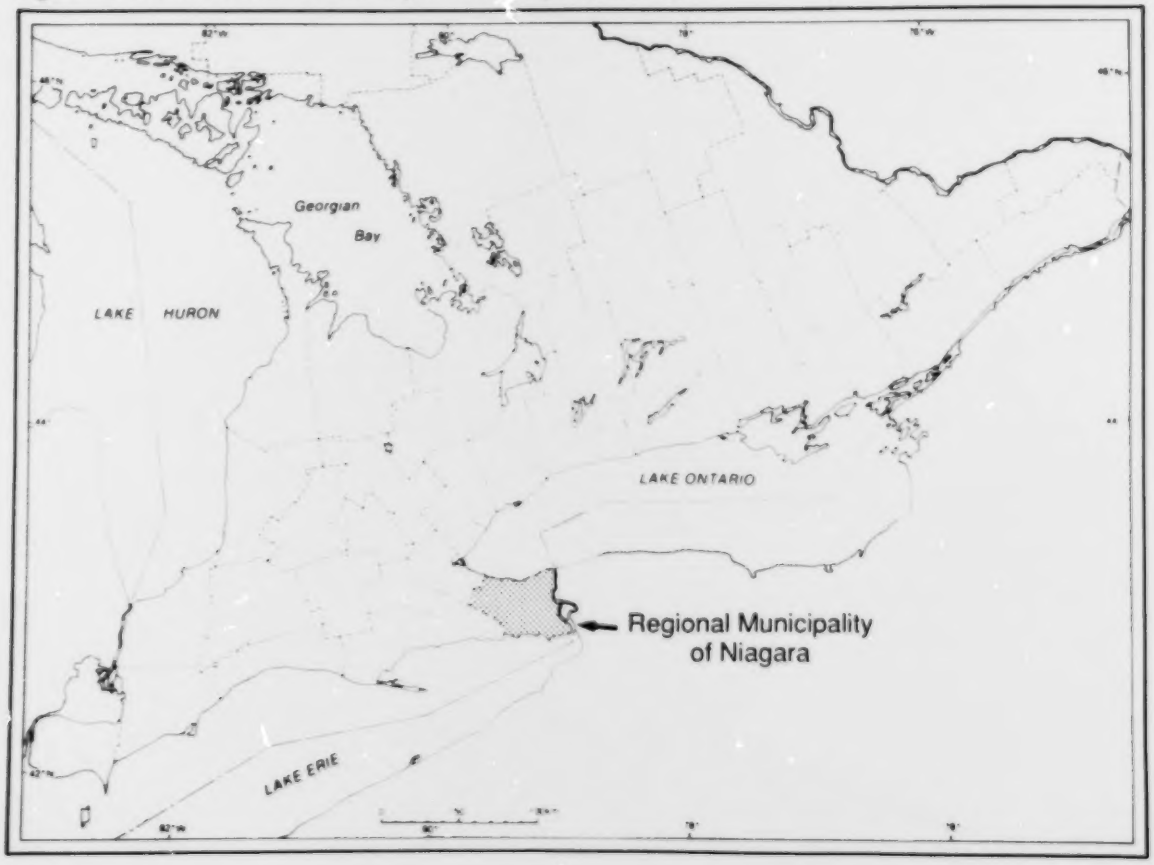


Figure 2. General location of the Regional Municipality of Niagara.



GENERAL DESCRIPTION OF THE AREA

General Information

The general location of the Regional Municipality of Niagara is shown in Figure 2. The municipal boundaries, main roads and built-up areas are shown in Figure 3. Some of the more important geologic and physiographic features of the Niagara Region that affect the nature and location of its soils are shown in Figure 4. More detailed descriptions of the physiography are contained in Chapman and Putnam, 1984 (3). The surficial geology of the Niagara Region is described by Feenstra, 1981 (4), and the bedrock geology by Telford et al., 1976 (5).

In Table 1, the major soils mapped in the Niagara Region are correlated with surficial geologic materials, and physiographic features. The names of the physiographic features were obtained from Chapman and Putnam (3).

Figures 5 to 10 are schematic cross-sections of several landscapes in the Niagara Region, that depict the relationships of the most important soils, surficial geology, physiographic features and bedrock.

In Figure 5, the main soils of the major fruit growing area between the Niagara Escarpment and Lake Ontario are shown as they occur on the Lake Iroquois Plain and Bench. The Queenston shale bedrock is overlain in most places by variable thicknesses of Halton Till, on which the Jeddo and Chinguacousy soils have developed. On limited areas of the Plain, adjacent to the Iroquois Bench, reddish-hued Trafalgar and Morley soils have developed on clayey lacustrine sediments that are rarely more than 1 or 2 metres deep over Queenston shale.

Vineland and Grimsby soils, on which most of the Niagara tender fruit is grown, are located on relatively deep lacustrine sands that overlie Halton Till near Lake Ontario. Much of the Halton Till on the Iroquois Bench is overlain by less than 1 metre of lacustrine silty clay, on which Cashel and Peel soils have formed.

Figure 6 indicates the general relationship of soils to geologic materials, above the Niagara Escarpment, between the Escarpment and the Haldimand Clay Plain. The dominant physiographic feature of this area is the Vinemount Moraine, which is predominantly composed of Halton Till. This material has been somewhat modified by glacial lake action, with the result that the Oneida and Chinguacousy soils developed on the Moraine have lower clay contents than normal. Where lacustrine clay deposits overlie the till, on the southern slopes of the Moraine, the Peel and Malton soils occur. Further south, as the Haldimand Clay Plain begins, the clay deposits thicken to more than 1 m, the Beverly and Toledo soils have developed. The only other notable soils in this area are the shallow to bedrock Farmington soils between the Niagara Escarpment and the Vinemount Moraine.

In Figure 7, a schematic cross-section of the Haldimand Clay Plain shows the general relationship of clay soils between the Vinemount Moraine and Lake Erie. In the northern part of the Plain, where the sediments are predominantly silty clay, Beverly and Toledo soils most commonly occur. Heading south, these sediments grade into lacustrine heavy clay, resulting in mainly Haldimand and Lincoln soils. As Figure 7 shows, moderately well-drained Smithville soils are usually only found on the slopes of stream and river channels on the Plain.

Figure 8 provides a schematic cross-section of the Fonthill Kame and its southern slopes. The Fonthill and Ridgeville soils on the Kame have developed in alternating layers of coarse sandy loam and gravelly sand. On the south slopes of the Kame, Grimsby and Vineland soils occur on the deeper sandy deposits. Further south, as the sand thins on the Haldimand Clay Plain, Tavistock and Maplewood soils occur. As the sand runs out, Beverly and Toledo soils predominate.

The relationship of soils to geological deposits, near the Wainfleet Bog, is illustrated in Figure 9. The presence of the Bog and its organic soils are due to water being ponded in front of the Onondaga Escarpment.

Figure 10 illustrates another situation that occurs along the Onondaga Escarpment, mainly between the urban centres of Welland and Fort Erie. In this case, the poorly and imperfectly drained Welland and Niagara soils have developed in reddish-hued, lacustrine, heavy clay in front of the Onondaga Escarpment. Although there are some Farmington soils on the Escarpment face, above the Escarpment, Oneida and Chinguacousy soils have formed in the reddish, wave-washed tills of the Fort Erie Moraine.

In Table 2, the major soils that are mapped in the Niagara Region, and their drainage conditions, are listed along with soils of the other drainage conditions that occur on the same parent materials.

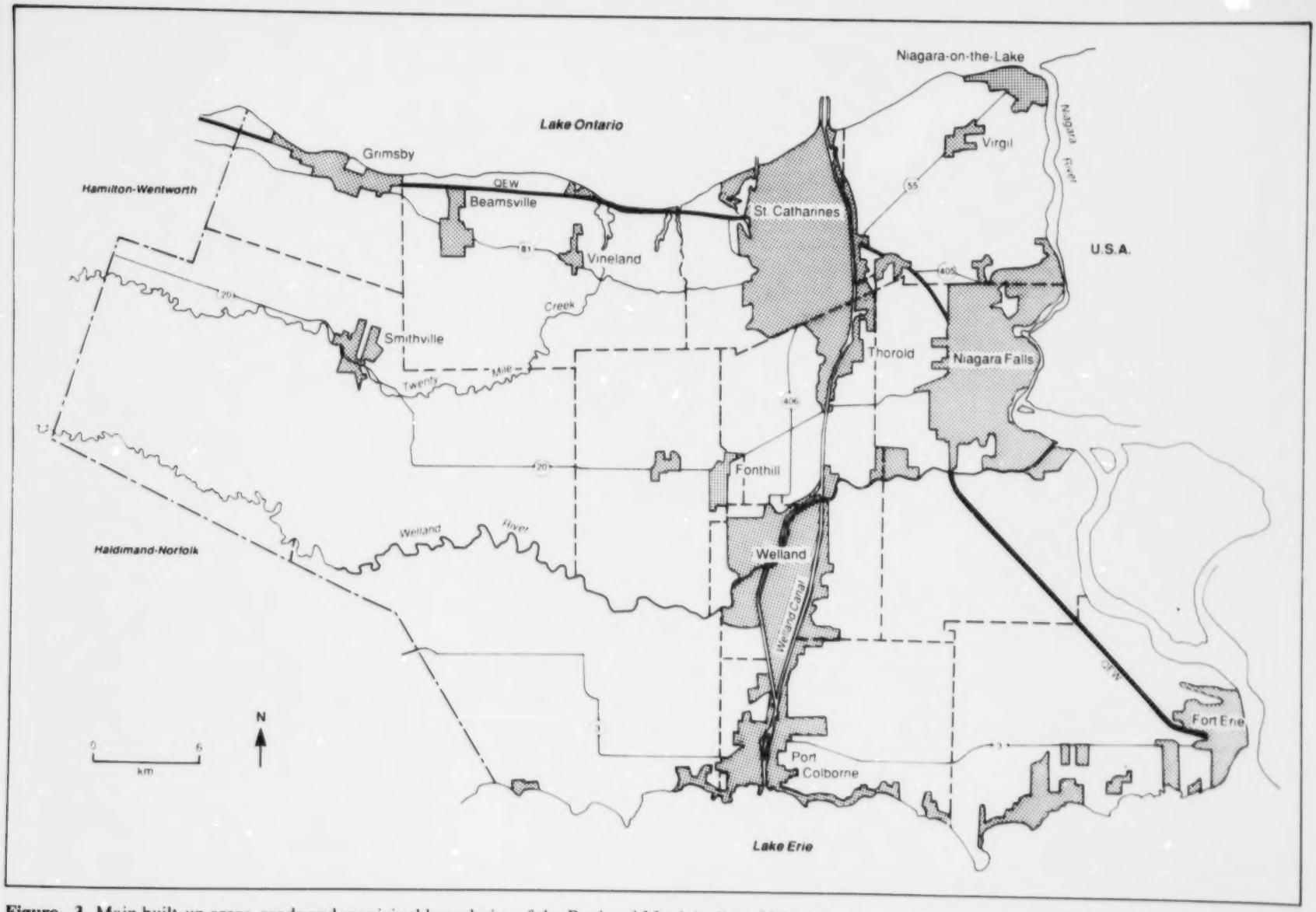


Figure 3. Main built-up areas, roads and municipal boundaries of the Regional Municipality of Niagara.

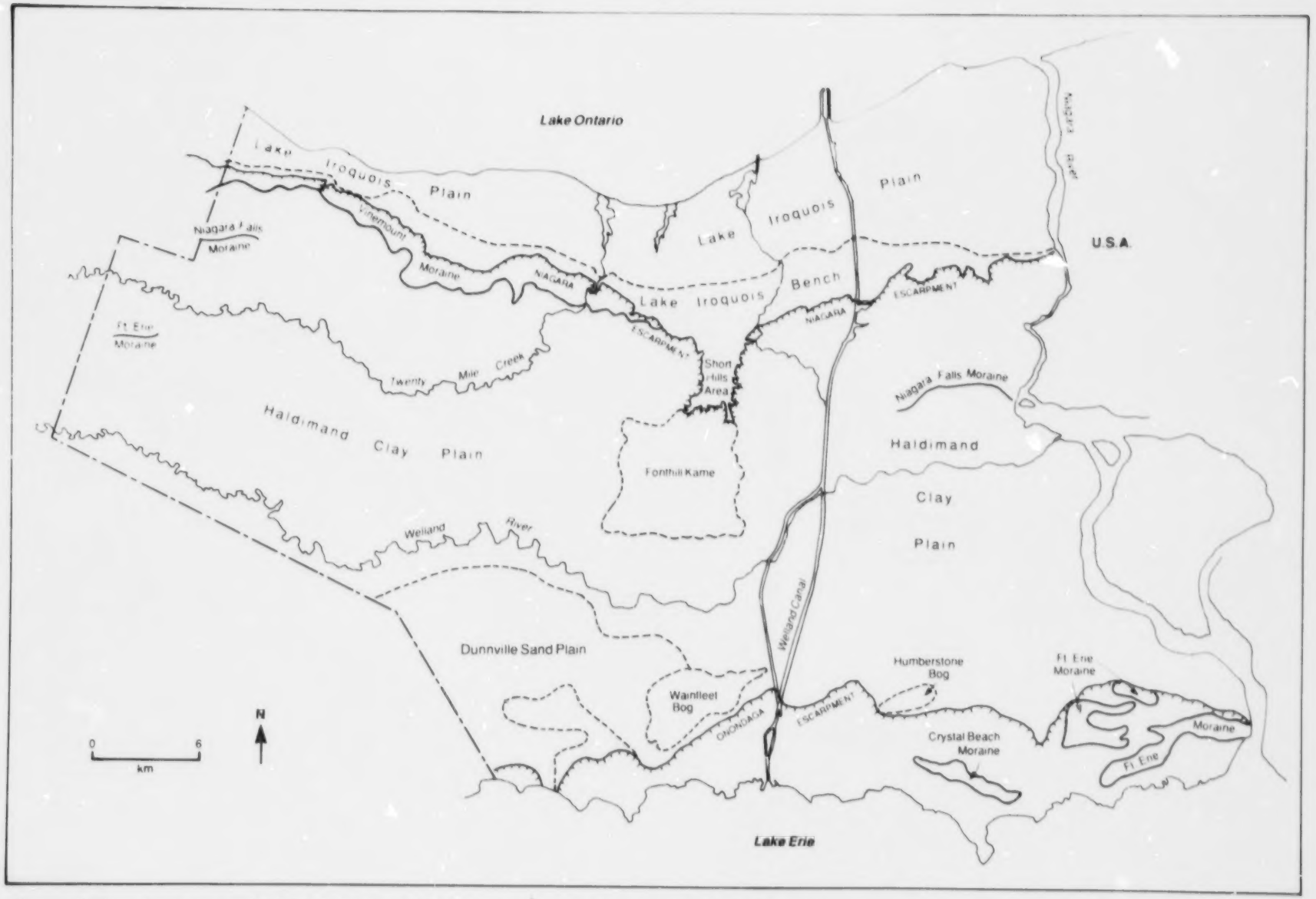


Figure 4. Some important geologic and physiographic features in the Regional Municipality of Niagara.

Table 1. Correlation of soils with surficial geology and physiography in the Regional Municipality of Niagara

Well-drained	Imperfectly drained	Poorly or very poorly drained	Geologic deposits (4,5)	Physiographic features (3)
Glacial Till				
Oneida	Chinguacousy	Jeddo	clay loam till (Halton Till)	Vinemount, Niagara Falls and Fort Erie Moraines, Iroquois Plain, Iroquois Bench
	Tavistock (till phase)	Maplewood (till phase)	40-100 cm loamy sediments over clay loam till (Halton Till)	Vinemount, Niagara Falls and Fort Erie Moraines, Iroquois Plain, Iroquois Bench
	Berrien (till phase)		40-100 cm sandy sediments over clay loam till (Halton Till)	Vinemount, Niagara Falls and Fort Erie Moraines, Iroquois Plain, Iroquois Bench
Cashel	Peel	Malton	40-100 cm clayey sediments over clay loam till (Halton Till)	Vinemount, Niagara Falls and Fort Erie Moraines, Iroquois Plain, Iroquois Bench
Glaciolacustrine Sands				
Fox	Brady	Granby	Shallow water lacustrine sand, loamy sand	Iroquois Plain, south slopes of Fonthill Kame, Dunnville Sand Plain
Grimsby	Vineland	Flamborough	Shallow water lacustrine very fine sand, very fine sandy loam	Iroquois Plain, south slopes of Fonthill Kame
Glaciolacustrine Silts				
Brant	Tuscola	Colwood	Shallow to medium water lacustrine silts and loams	Iroquois Plain, lower slopes of Fonthill Kame, Haldimand Clay Plain, Dunnville Sand Plain
Walsher	Vittoria	Silver Hill	40-100 cm sandy sediments over lacustrine silts and loams	Iroquois Plain, lower slopes of Fonthill Kame, Haldimand Clay Plain, Dunnville Sand Plain
Glaciolacustrine Silty Clays				
Brantford	Beverly	Toledo	Deep water lacustrine silty clay and clay	Haldimand Clay Plain, Iroquois Bench
Bennington	Tavistock	Maplewood	40-100 cm loamy sediments over lacustrine clay	Haldimand Clay Plain, Iroquois Plain, Iroquois Bench
Bookton	Berrien	Wauseon	40-100 cm sandy sediments over lacustrine clay and silty clay	Haldimand Clay Plain, Iroquois Plain, Iroquois Bench
	Trafalgar	Morley	Mainly reddish-hued lacustrine silty clay and silty clay loam	Iroquois Plain, Iroquois Bench

Table 1. Correlation of soils with surficial geology and physiography in the Regional Municipality of Niagara (continued)

Well-drained	Imperfectly drained	Poorly or very poorly drained	Geologic deposits (4,5)	Physiographic features (3)
Glaciolacustrine Silty Clays (continued)				
Smithville	Haldimand	Lincoln	Deep water lacustrine heavy clay	Haldimand Clay Plain, Iroquois Plain
Ontario	Niagara	Welland	Reddish-hued deep water lacustrine heavy clay	Haldimand Clay Plain, Iroquois Plain
	Tavistock (heavy clay phase)		40-100 cm loamy sediments over lacustrine heavy clay	Haldimand Clay Plain, Iroquois Plain
Glaciofluvial Deposits				
Fonthill	Ridgeville		Fluvial and kame sediments, mainly coarse sandy loam and gravelly sand	Fonthill Kame
Eolian Deposits				
Plainfield	Walsingham		Eolian dunes, sand plains	Dunnville Sand Plain, south slopes of Fonthill Kame, local dunes
Shallow Deposits over Bedrock				
Farmington	Franktown	Brooke	Variable sediments 10-100 cm over mainly limestone and dolostone bedrock	Bedrock plains adjacent to Niagara and Onondaga Escarpments
	Trafalgar (shallow phase)	Morley (shallow phase)	Reddish-hued clayey sediments 50-100 cm over Queenston shale	Iroquois Plain, Iroquois Bench
Organic Deposits				
		Holly	Organic swamp sediments, 40-160 cm over loamy mineral sediments	Wainfleet Bog, Humberstone Bog
		Lorraine	Organic fen sediments, 40-160 cm over clayey mineral sediments	Wainfleet Bog, Humberstone Bog, local fens
		Portsmouth	Organic swamp sediments >160 cm	Wainfleet Bog, Humberstone Bog, local swamps
		Port Colborne	Organic fen sediments >160 cm	Wainfleet Bog, Humberstone Bog, local fens
		Quarry	Organic swamp sediments, 40-160 cm over loamy mineral sediments	Wainfleet Bog, local swamps
		Sherkston	Organic fen sediments >160 cm	Wainfleet Bog, Humberstone Bog, local fens
		Wainfleet	Organic fen sediments >160 cm	Wainfleet Bog, Humberstone Bog, local fens

Table 1. Correlation of soils with surficial geology and physiography in the Regional Municipality of Niagara (continued)

Well-drained	Imperfectly drained	Poorly or very poorly drained	Geologic deposits (4,5)	Physiographic features (3)
Floodplain Alluvium				
Alluvium 1 (variable drainage)			Variable alluvial sediments on floodplains	Active river and stream floodplains
Alluvium 2 (variable drainage)			Mainly sandy alluvial sediments on floodplains	Active river and stream floodplains
Alluvium 3 (variable drainage)			Mainly loamy alluvial sediments on floodplains	Active river and stream floodplains
Alluvium 4 (variable drainage)			Mainly clayey alluvial sediments on floodplains	Active river and stream floodplains

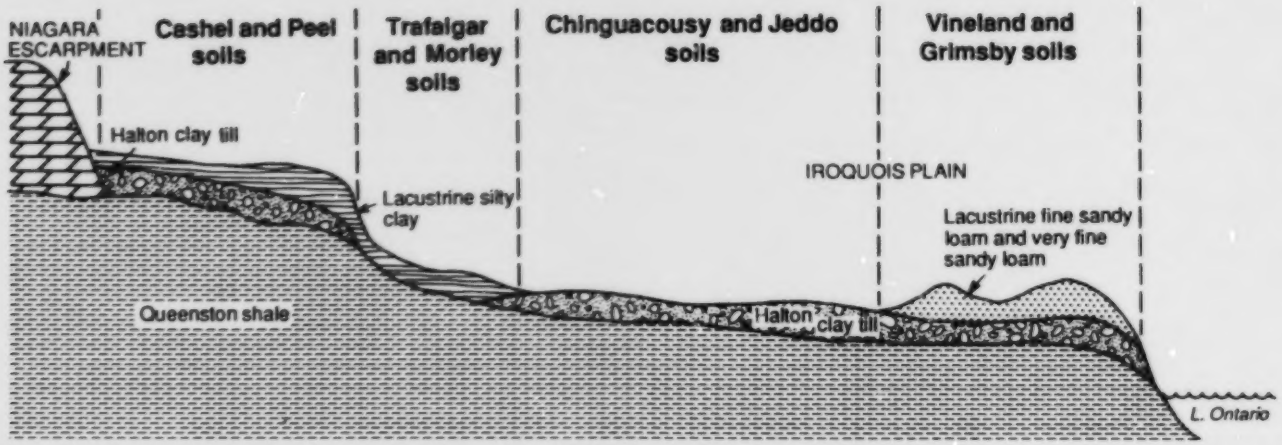


Figure 5. Schematic landscape cross-section showing the relationship of soils on the Iroquois Plain between the Niagara Escarpment and Lake Ontario.

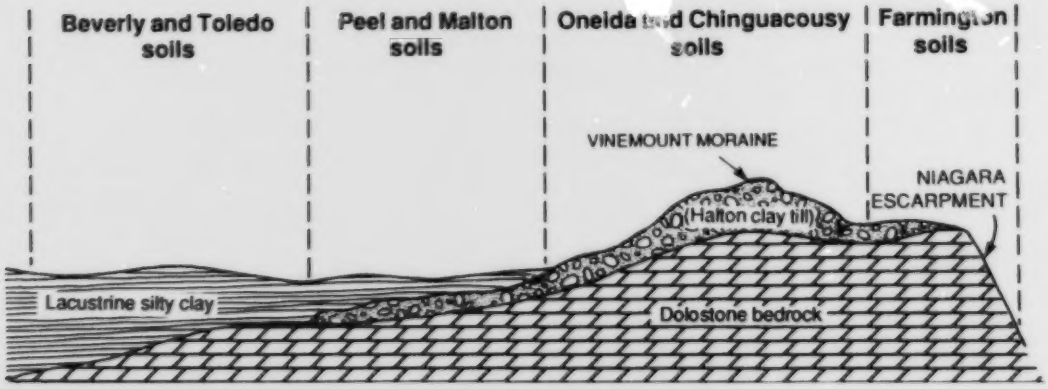


Figure 6. Schematic landscape cross-section showing the relationship of soils in the area of the Vinemount Moraine, between the Niagara Escarpment and the Haldimand Clay Plain.

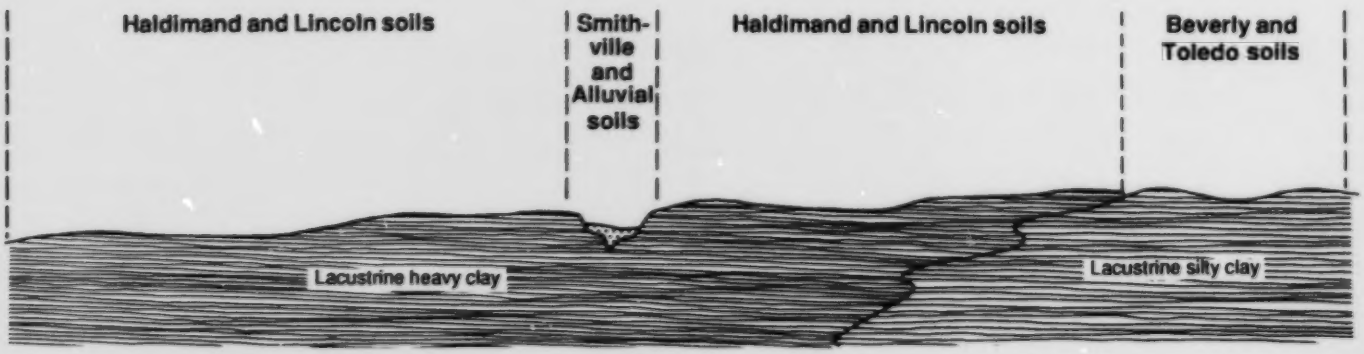


Figure 7. Schematic landscape cross-section showing the relationship of soils on the Haldimand Clay Plain.

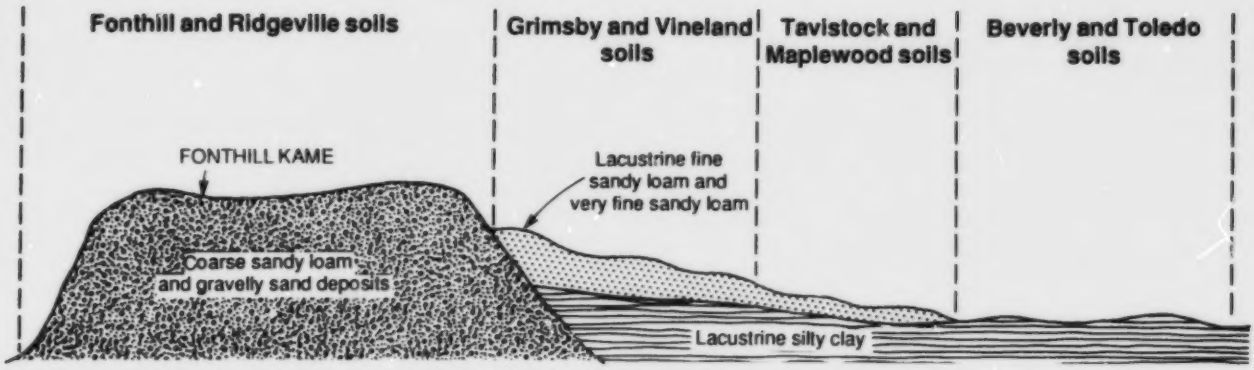

Fonthill and Ridgeville soils
Grimsby and Vineland soils
Tavistock and Maplewood soils
Beverly and Toledo soils
FONTHILL KAME
Lacustrine fine sandy loam and very fine sandy loam
Coarse sandy loam and gravelly sand deposits
Lacustrine silty clay

Figure 8. Schematic landscape cross-section showing the relationship of soils on the Fonthill Kame and its southern slopes.

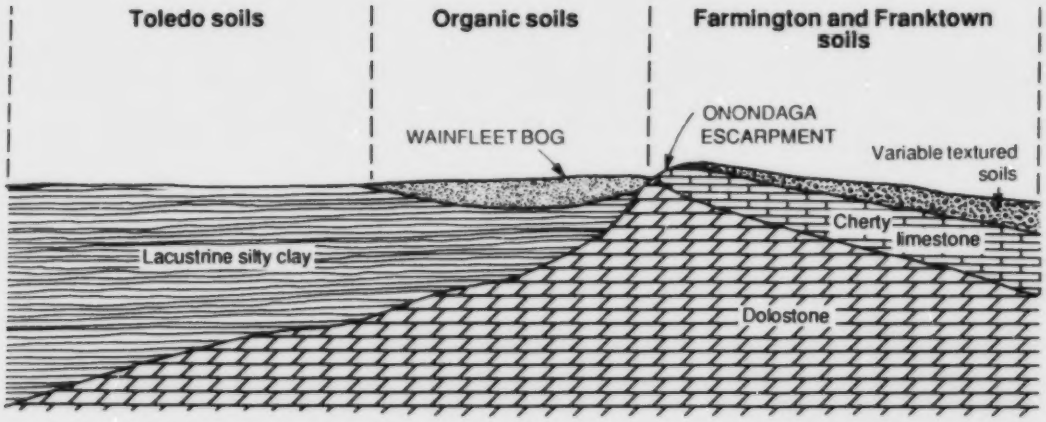


Figure 9. Schematic landscape cross-section showing the relationship of soils to bedrock in the vicinity of the Wainfleet Bog.

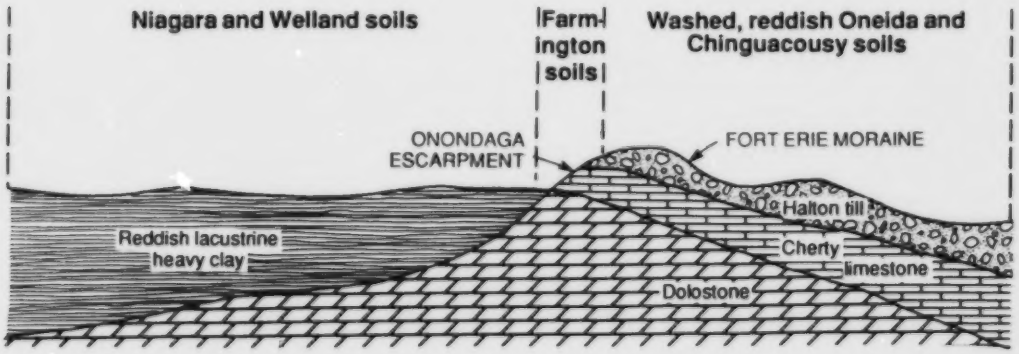


Figure 10. Schematic landscape cross-section showing the relationship of soils to bedrock in the vicinity of the Fort Erie Moraine.

Table 2. Soils mapped in the Regional Municipality of Niagara and their drainage relationships

Drainage Conditions and Names of Soils Developed on Similar Parent Materials

Map unit component name	Map unit component symbol	Well-drained	Imperfectly drained	Poorly drained	Very poorly drained
Alluvium	ALU	Variable drainage			
Bennington	BNG	Bennington	Tavistock	Maplewood	
Berrien	BRR	Bookton	Berrien	Wauseon	
Beverly	BVY	Brantford	Beverly	Toledo	
Bookton	BOO	Bookton	Berrien	Wauseon	
Brady	BAY	Fox	Brady	Granby	
Brant	BRT	Brant	Tuscola	Colwood	
Brantford	BFO	Brantford	Beverly	Toledo	
Brooke	BOK	Farmington	Franktown	Brooke	
Cashel	CSH	Cashel	Peel	Malton	
Chinguacousy	CGU	Oneida	Chinguacousy	Jeddo	
Colwood	CWO	Brant	Tuscola	Colwood	
Farmington	FRM	Farmington	Franktown	Brooke	
Flamborough	FMB	Grimsby	Vineland	Flamborough	
Fonthill	FNT	Fonthill	Ridgeville		
Fox	FOX	Fox	Brady	Granby	
Franktown	FKW	Farmington	Franktown	Brooke	
Granby	GNY	Fox	Brady	Granby	
Grimsby	GMY	Grimsby	Vineland	Flamborough	
Haldimand	HIM	Smithville	Haldimand	Lincoln	
Holly	HOY				Holly
Jeddo	JDD	Oneida	Chinguacousy	Jeddo	
Lincoln	LIC	Smithville	Haldimand	Lincoln	
Lorraine	LRR				Lorraine
Malton	MAT	Cashel	Peel	Malton	
Maplewood	MPW	Bennington	Tavistock	Maplewood	
Morley	MOY		Trafalgar	Morley	
Niagara	NGR	Ontario	Niagara	Welland	
Oneida	OID	Oneida	Chinguacousy	Jeddo	
Ontario	OTI	Ontario	Niagara	Welland	
Peel	PEL	Cashel	Peel	Malton	
Plainfield	PFD	Plainfield	Walsingham		
Port Colborne	PCE				Port Colborne
Portsmouth	PUH				Portsmouth
Quarry	QRY				Quarry
Ridgeville	RVE	Fonthill	Ridgeville		
Sherkston	SRK				Sherkston
Silver Hill	SIH	Walsher	Vittoria	Silver Hill	
Smithville	SHV	Smithville	Haldimand	Lincoln	
Tavistock	TVK	Bennington	Tavistock	Maplewood	
Toledo	TLD	Brantford	Beverly	Toledo	
Trafalgar	TFG		Trafalgar	Morley	
Tuscola	TUC	Brant	Tuscola	Colwood	
Vineland	VLD	Grimsby	Vineland	Flamborough	
Vittoria	VIT	Walsher	Vittoria	Silver Hill	
Wainfleet	WAF				Wainfleet
Walsher	WSH	Walsher	Vittoria	Silver Hill	
Walsingham	WAM	Plainfield	Walsingham		
Wauseon	WUS	Bookton	Berrien	Wauseon	
Welland	WLL	Ontario	Niagara	Welland	

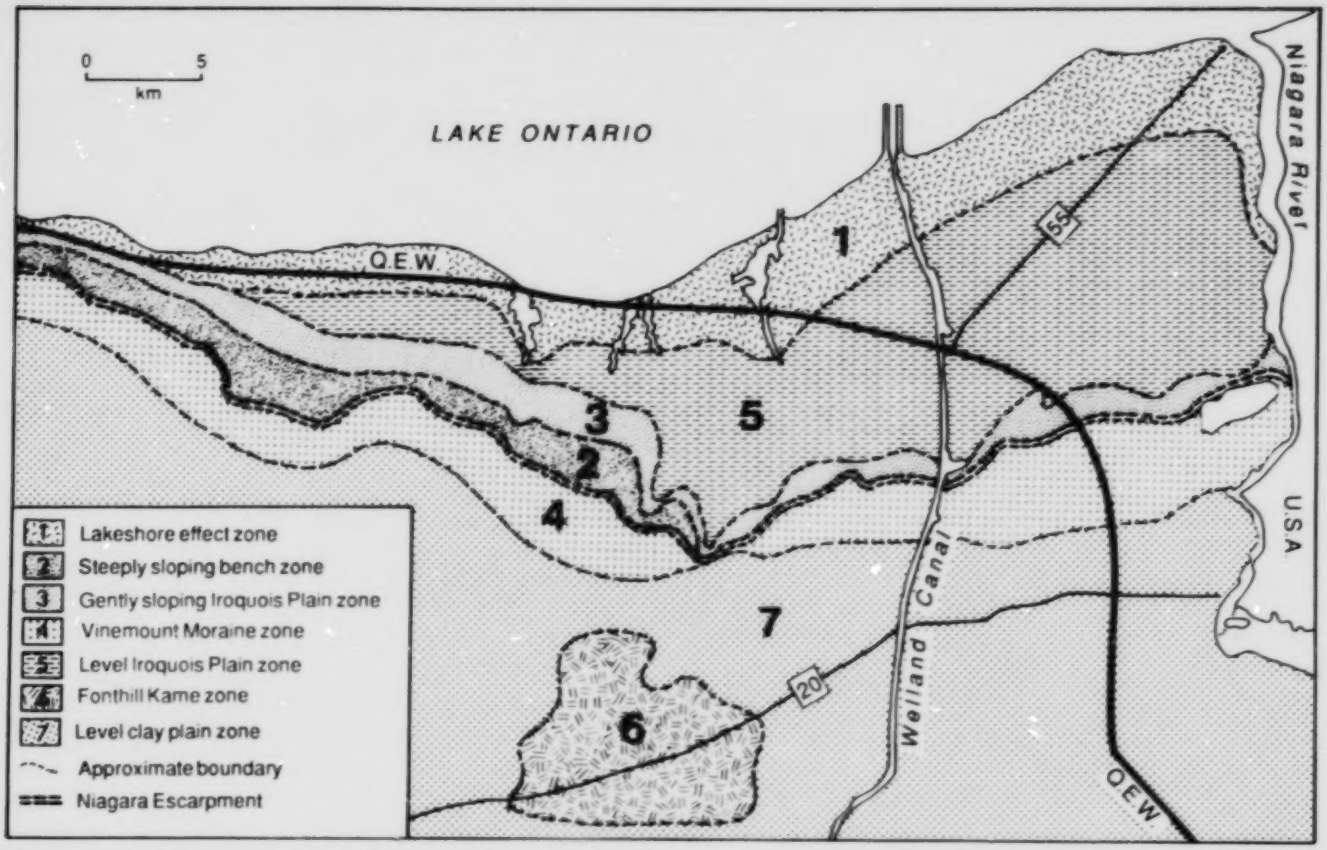


Figure 11. Grape and tender fruit climatic zones in the Regional Municipality of Niagara.

Climate

The Regional Municipality of Niagara is located within the Niagara Fruit Belt Climatic Region and the Lake Erie Counties Climatic Region. Only the northern fringe of the Region lies within the Niagara Fruit Belt Climatic Region, which is separated from the Lake Erie Counties Climatic Region by the Niagara Escarpment. A number of the more important climatic parameters for the two Climatic Regions that are shown in Table 3, have been derived from Brown et al. (6).

The area within the Niagara Fruit Belt Climatic Region, between the Niagara Escarpment and Lake Ontario, is probably better suited climatically to tender fruit and grape crops than any other area in Ontario. This area has been subdivided into a number of grape climatic zones by Wiebe and Andersen (7). These climatic zones also apply to tender fruit crops, and in Figure 11, a map adapted from Wiebe and Andersen's map shows grape and tender fruit climatic zones in the Region. The physiographic setting of each zone is identified, and the zones are numbered in descending order of suitability for grape and tender fruit crops, e.g. the most suitable climatic zone is No. 1, the least suitable is No. 7, etc.

Climate is very important in site selection for grape and tender fruit crops. For grapes, it is probably more important than soil characteristics; for tender fruit crops, climate may be equally as important. The importance of climate in site selection for apples, pears, plums, and small fruit crops, is less critical than for tender fruit and grape crops. For these hardier fruit crops, the climatic zones of Figure 11 are most important for pears and plums, less important for apples and least important for the small fruit crops.

Ross (8) has recently developed a system in which climate below the Niagara Escarpment is classified for tender fruit and grapes into 3 zones of suitability based on the incidence of low winter temperatures and late spring frosts.

Table 3. Climatic data from the Regional Municipality of Niagara

Parameters	Estimated climatic means and ranges: Niagara Fruit Belt	Estimated climatic means and ranges: Lake Erie Counties
Mean Daily Temperature	9° C	8° to 9° C
Mean Daily Minimum Temperature for January	-7° C	-7° to -8° C
Mean Daily Maximum Temperature for July	27° to 28° C	28° C
Frost Free Days	160-170	150
Mean Date of Last Occurence of Frost in Spring	May 10	May 10 - May 15
Mean Date of First Occurrence of Frost in Fall	Oct. 15	Oct. 8
Corn Heat Units	3300	3000 - 3300
Mean Annual Precipitation	76 - 81 cm	79 - 89 cm
Mean May to September Precipitation	33 - 35 cm	33 - 35 cm

HOW THE SOILS WERE MAPPED AND CLASSIFIED

Soil Mapping

First, a legend was developed by compiling information from existing resource publications such as geological reports, old soil maps, etc., and combining this with preliminary field observations.

Next, with the aid of a stereoscope, tentative soil boundaries were drawn on the most recent aerial photographs (scale 1:15,840). With the legend as a guide, these soil boundaries and the soils were checked in the field.

Field checking of the soils was done along all public roads, where the soil was periodically examined, especially where stereoscopic investigations had indicated major changes. Soils were checked in fields, woodlots, and undisturbed road allowances. Most sites were close to roads, but occasionally it was necessary to traverse some distance into concessions to verify soil boundaries.

Soil probes and Dutch augers were the tools most commonly used to investigate soils. Soils were usually checked and described to a depth of 1 m except along roads, ditches and streams where shovels were used to scrape down exposures, occasionally to depths between 1 and 2 m. Guidelines and nomenclature for soil site descriptions were mainly obtained from the CanSIS Manual (9), Munsell charts (10), and the Ontario Institute of Pedology Field Manual for Describing Soils (11). Soil samples were periodically collected for laboratory analyses, to verify or supplement field observations. Between 25 and 30 percent of all sites were sampled for this purpose.

The next operation was to compile the field and laboratory information in the office onto 1:25,000 scale topographic base maps. Maps compiled in this way were published the year following the field mapping as preliminary soil maps.

The last step was to prepare the final maps. This was done by changing the map unit designations on the preliminary maps to the final symbols, and by making any necessary boundary changes. These final maps were prepared for publication and entered into a computerized data file by the Cartography Section of the Land Resource Research Centre, Research Branch, Agriculture Canada, Ottawa.

Survey Intensity and Map Reliability

The survey intensity level provides an idea of the precision with which the soil survey was done. Survey intensity level 1 indicates the precision of detailed, large scale surveys, e.g. 1:10,000; survey intensity level 5 indicates the precision of small scale surveys, e.g. 1:250,000 (12). The survey intensity level of the Niagara soil survey is at an intermediate level, probably closest to level 2.

In this survey there was at least one soil inspection in most of the larger map polygons. Boundaries of polygons were checked at intervals in the field but mainly extrapolated from air photos. The number of inspections per cm^2 on the Niagara soil maps was about 0.25, or about one inspection per 26 ha (64 ac).

Considering the survey intensity level and scale of the Niagara soil maps, the most appropriate use of these maps is to act as a guide for planning purposes for land areas such as townships, conservation areas, large urban subdivisions, or large farms. Suitability of the maps for decisions on land use or management of smaller areas, such as small farms, small subdivisions, or individual building sites, is less appropriate, because the average area covered by a map polygon on the Niagara soils maps, is about 24 ha (60 ac).

Because of the scale of mapping (1:25,000), the minimum size delineation is about 2.4 ha (6 ac). Since all soil materials, drainages and topography cannot be completely described by the map symbol, inclusions can occur within the map polygons. Given the scale of the Niagara soil maps, there could be inclusions ranging up to 2.4 ha in size, in any map polygon.

Soil Classification

Soils of the Niagara Region have developed in soil parent materials ranging in texture from heavy clays to coarse gravels. Most soil differences are related to these textural differences. Variations in drainage also cause differences between soils developed on the same soil parent materials. Other soil forming factors, such as topography, time, climate and vegetation, have also contributed to soil differences.

Most of the original soil parent materials in the Niagara Region are highly calcareous and alkaline. However, the soils developed on such materials are less calcareous because of the leaching action of water on soil bases, especially calcium. This leaching action, along with associated soil weathering, causes the development of soil horizons near the soil surface. These horizons differ from each other in properties such as texture, colour, thickness, structure and consistence.

A vertical section through the soil exposes a characteristic sequence of soil horizons that is called a soil profile. These soil horizons are usually designated as A, B and C horizons, and subdivided further when more detailed descriptions are required.

Figure 12 shows the soil horizons of a well-drained soil profile typical of many in the Niagara Region. The A horizon is the surface horizon, which can be further subdivided into an Ap or Ah and Ae horizons (13). Ah horizons are dark-coloured and usually have high organic matter contents. Ap horizons occur where Ah horizons have been cultivated, and usually constitute the topsoil, or plough layer. Ae horizons are leached, light-coloured, and have lower organic matter contents than Ap or Ah horizons. Some or all of the Ae horizon materials are often incorporated into the plough layer, especially when ploughing is deep, or on eroded slopes.

B horizons are usually more reddish, finer-textured, and more compact than A horizons. When they contain significantly more clay than overlying A horizons they are called Bt horizons (13). When they differ from A horizons mainly by colour or structure differences, they are called Bm horizons (13). Most well-drained soils in the Niagara Region have Bt horizons that are overlain by Ae or Bm horizons, as shown in Figure 12. On moderately to severely eroded slopes, B horizons are often exposed at the surface.

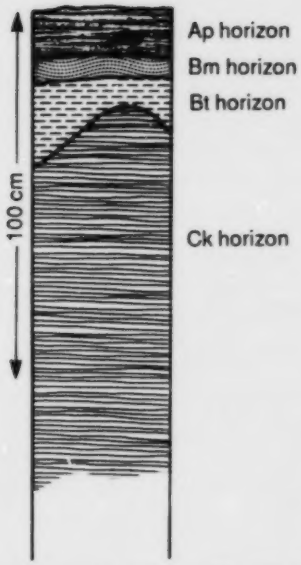


Figure 12. Diagrammatic soil profile of a typically well-drained soil in the Regional Municipality of Niagara.

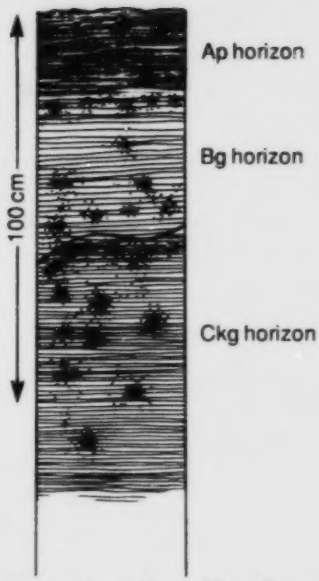


Figure 13. Diagrammatic soil profile of a typical poorly drained soil in the Regional Municipality of Niagara.

C horizons underlie B horizons in normal soil profiles, as shown in Figure 12. They are composed of soil parent material that has undergone relatively little weathering compared with the A and B horizons. In the Niagara Region, C horizons are moderately to strongly calcareous because they contain free carbonates. They are called Ck horizons because these carbonates exhibit visible effervescence when contacted with dilute hydrochloric acid (13). If the texture or origin of C horizons is significantly different from those of overlying A or B horizons, e.g. lacustrine sand over clay till, the C horizon is designated as a IIC horizon. C horizons are usually exposed only on roadcuts or on certain severely eroded slopes.

Imperfectly drained soils have the same type and sequence of horizons as well-drained soils, but because they are wetter for longer periods of time, "gley" conditions develop. These conditions are mainly caused by the reduction of iron compounds, and are usually indicated by yellowish-brown mottling in the Ae, Bm or Bt horizons. The horizons are then designated as Aegj, Bmgj and Btgj horizons (13).

Most poorly drained mineral soils in the Niagara Region have soil horizon sequences similar to that shown in Figure 13. These soils are wet for long periods of time, providing conditions that are especially favorable for "gley" formation. This means that all horizons are gray to grayish-brown in colour, and often have yellowish-brown mottles. The B and C horizons of these poorly drained profiles are usually designated as Bg and Ckg horizons (13).

There are some very poorly drained organic soils in the Region that have more than 40 cm of surface organic soil, and contain at least 30 percent organic matter. Horizons of organic soils are called O horizons. Different lowercase suffixes are used, e.g. Oh, Om, Of, depending on the degree of decomposition of the organic materials (13).

The highest category of soil classification in the Canadian System of Soil Classification is the order. Orders are subdivided into great groups; great groups into subgroups; subgroups into families; families into series; and series into phases (13). Soils, as described in this report, consist of series, phases or miscellaneous land units. Soils map units are composed of combinations of 1 or 2 soils or miscellaneous land units.

Soil Orders

Soil orders that have been noted in the Niagara Region are the Luvisolic, Brunisolic, Gleysolic, Regosolic and Organic orders.

Most well- and imperfectly drained soils in the Region have been classified in the Luvisolic order. They are characterized by light-coloured eluvial horizons and darker-coloured illuvial B horizons in which clay has accumulated.

Soils of the Brunisolic order, which lack the same degree of horizon development as Luvisols, are present in the Niagara Region. They seem to be most prevalent in some imperfectly drained soils, and in soils that are relatively young in age, such as alluvial floodplain soils and eolian sands.

Most poorly drained soils in the Region were classified in the Gleysolic order. These soils are associated with high groundwater conditions during some period of the year. In the heavier clay soils, groundwater frequently occurs as disconnected lenses. Such groundwater lenses commonly "perch" on relatively impermeable lower horizons. These soils have at least one gray or grayish-brown gley horizon, and usually have prominent mottles with 50 cm of the surface.

Soils belonging to the Regosolic order occur throughout the Region on small, localized areas of severely eroded slopes, colluvial depressions and alluvial floodplains. They are characterized by weak or absent soil horizon development.

Soils of the Organic order are saturated by water for prolonged periods of time. They are characterized by high proportions of organic matter and a minimum thickness of 40 cm of organic materials. They were mapped in the Wainfleet and Humberstone Bogs, as well as in smaller marshy areas.

Soil Great Groups and Subgroups

In the Niagara Region, soils that belong to the Luvisolic order are classified in the Gray Brown Luvisol great group. Well-drained soils of this group can be classified into the Orthic Gray Brown Luvisol subgroup and the Brunisolic Gray Brown Luvisol subgroup. Imperfectly drained soils are classified in the Gleyed Gray Brown Luvisol subgroup and the Gleyed Brunisolic Gray Brown Luvisol subgroup.

Brunisolic soils of the Region are mostly classified into the Melanic Brunisol great group. These can be further subdivided into the Orthic, Eluviated or Gleyed Melanic Brunisol subgroups. A minority of Brunisolic soils are classified in the Eutric Brunisol great group, where they can be further subclassified into Orthic, Eluviated or Gleyed Eutric Brunisol subgroups.

Most Gleysolic order soils in the Region are classified into the Humic Gleysol great group. Most of these are subclassified into the Orthic Humic Gleysol subgroup, and a few into the Rego Humic Gleysol subgroup. There are also some Gleysolic soils in the Gleysol and Luvic Gleysol great groups.

Soils of the Organic order, mapped in the Region, were classified in either the Mesisol or Fibrisol great groups. Many of these were subclassified in Terric subgroups because of their relative shallowness over mineral soils.

Soils Families

The soil family is a relatively recent addition to the Canadian System of Soil Classification that has not been used as much as other categories such as order and series. Soil subgroups are divided into soil families on the basis of particle size, mineralogy, reaction, depth and soil climate in mineral soils. Somewhat different criteria are used in organic soils.

Soil Series

The soil series is a subdivision of the soil family based on relatively detailed properties, such as soil colour, thickness of horizon, etc. Most of the soils, that make up the soil map units in the Niagara Region, consist of soil series or phases of soil series.

Soil Phases

In the Niagara Region, the soil phase is used to subdivide soil series on the basis of soil or land properties considered significant for plant growth or soil uses. Most soils in the Region have at least one phase designation, e.g. TLD.C is the coarse sandy phase of the Toledo soil, with 15-40 cm of sand over clay. Similarly, PFD.D is the dune phase of the Plainfield soil, mapped on wind blown dunes. Following is a list of the phase designations and their definitions:

B — soils with brownish-coloured hues
C — 15-40 cm sandy textures over soils with contrasting textures
D — eolian fine sand formed into dunes
H — 40-100 cm loamy textures over lacustrine heavy clay or 40-100 cm lacustrine heavy clay over clay loam till
L — 15-40 cm loamy textures over soil with contrasting textures
P — 15-40 cm peaty soil material over mineral soil
R — soils with reddish-coloured hues
S — 50-100 cm soil materials over bedrock
T — 40-100 cm lacustrine sediments over clay loam till
V — 20-50 cm soil materials over bedrock
W — washed clay loam till modified by lacustrine processes

Miscellaneous Land Units

There are a number of land designations, too variable or complex to designate as series or soil phases, that are listed as miscellaneous land units. Examples of some soil map units that are composed of miscellaneous land units are: Marsh (MAR); and Beach-scarp complex (CPX 1).

Soil Map Units

Soil map units in the Niagara Region, are the combinations of 1 or 2 soils or miscellaneous land units that occupy any soil map area enclosed by a boundary. The soils, and their respective slopes, that make up map units, are indicated on the soil map in the soil legend, by the map unit component symbol.

For example, the LIC 1 soil map unit contains only one map unit component, the Lincoln soil, LIC. On the soil map, the slope will always be indicated in the denominator of the map designation, e.g. LIC 1/C, where C indicates a simple slope of 2-5 percent. Another example, the LIC 2 map unit, contains only the coarse sandy phase, LIC.C. It is designated on the soil map as LIC 2/B, where B indicates slopes of 0-2 percent. Sometimes, in a soil map unit such as LIC 1, the Lincoln soil occurs on two slopes, e.g. LIC 1/B>C.

An example of a soil map unit, with two components, is LIC 5. It is composed of the Lincoln and Smithville soils in 70:30 or 50:50 proportions. To determine whether the Lincoln soil is dominant (70 percent), or co-dominant (50 percent), in the map unit, it is necessary to scan the slope symbols of the denominator of the map designation, e.g. LIC 5/B>B, where both components of the unit occupy B slopes (0-2 percent), but the Lincoln soil is dominant (70 percent). In the other case, LIC 5/B=B, the Lincoln soil, is co-dominant (50 percent), or equal in area, to the Smithville component.

GENERAL DESCRIPTIONS OF THE SOILS

Soil Key

A. Soils Developed on Glacial Till Deposits

I. Clay loam till parent materials

(a) Moderately well-drained
Oneida (OID)
Oneida loamy phase (OID.L)
Oneida loamy red phase (OID.LR)
Oneida red phase (OID.R)
Oneida red washed phase (OID.RW)
Oneida washed phase (OID.W)

(b) Imperfectly drained
Chinguacousy (CGU)
Chinguacousy coarse phase (CGU.C)
Chinguacousy loamy phase (CGU.L)
Chinguacousy loamy red phase (CGU.LR)
Chinguacousy red phase (CGU.R)
Chinguacousy red washed phase (CGU.RW)
Chinguacousy washed phase (CGU.W)

(c) Poorly drained
Jeddo (JDD)
Jeddo loamy phase (JDD.L)
Jeddo loamy red phase (JDD.LR)
Jeddo red phase (JDD.R)
Jeddo red washed phase (JDD.RW)
Jeddo washed phase (JDD.W)

II. 40-100 cm loamy sediments over clay loam till parent materials

(a) Imperfectly drained
Tavistock till phase (TVK.T)
Tavistock till red phase (TVK.TR)

(b) Poorly drained
Maplewood till phase (MPW.T)
Maplewood till red phase (MPW.TR)

III. 40-100 cm sandy sediments over clay loam till parent materials

(a) Imperfectly drained
Berrien till phase (BRR.T)

IV. 40-100 cm lacustrine silty clay over clay loam till parent materials

(a) Moderately well-drained
Cashel (CSH)
Cashel heavy red phase (CSH.HR)
Cashel red phase (CSH.R)
Cashel washed phase (CSH.W)

(b) Imperfectly drained
Peel (PEL)
Peel coarse phase (PEL.C)
Peel heavy phase (PEL.H)
Peel heavy red phase (PEL.HR)
Peel loamy phase (PEL.L)
Peel loamy red phase (PEL.LR)
Peel red phase (PEL.R)

(c) Poorly drained
Malton (MAT)
Malton heavy phase (MAT.H)
Malton heavy red phase (MAT.HR)
Malton loamy red phase (MAT.LR)
Malton red phase (MAT.R)

B. Soils Developed on Lacustrine Deposits

I. Loamy sand and sand parent materials

(a) Rapidly drained
Fox (FOX)
Fox red phase (FOX.R)

(b) Imperfectly drained
Brady (BAY)
Brady red phase (BAY.R)

(c) Poorly drained
Granby (GNY)

(d) Very poorly drained
Granby peaty red phase (GNY.PR)

II. Reddish-hued fine sandy loam and loamy fine sand parent materials

(a) Well-drained
Grimsby (GMY)
Grimsby brown phase (GMY.B)

(b) Imperfectly drained
Vineland (VLD)
Vineland brown phase (VLD.B)

(c) Poorly drained
Flamborough (FMB)
Flamborough brown phase (FMB.B)

III. Silt loam and loam parent materials

(a) Well-drained
Brant (BRT)
Brant red phase (BRT.R)

(b) Imperfectly drained
Tuscola (TUC)
Tuscola red phase (TUC.R)

(c) Poorly drained
Colwood (CWO)
Colwood red phase (CWO.R)

IV. 40-100 cm sandy sediments over silt loam parent materials

(a) Well-drained
Walsher (WSH)

(b) Imperfectly drained
Vittoria (VIT)
Vittoria red phase (VIT.R)

(c) Poorly drained
Silver Hill (SIH)

V. Mostly silty clay parent materials

(a) Moderately well-drained
Brantford (BFO)
Brantford loamy phase (BFO.L)
Brantford loamy red phase (BFO.LR)
Brantford red phase (BFO.R)

(b) Imperfectly drained
Beverly (BVY)
Beverly coarse phase (BVY.C)
Beverly loamy phase (BVY.L)
Beverly loamy red phase (BVY.LR)
Beverly red phase (BVY.R)

(c) Poorly drained
Toledo (TLD)
Toledo coarse phase (TLD.C)
Toledo loamy phase (TLD.L)
Toledo loamy red phase (TLD.LR)
Toledo red phase (TLD.R)

(d) Very poorly drained
Toledo peaty phase (TLD.P)

VI. 40-100 cm loamy sediments over silty clay parent materials

(a) Well-drained
Bennington (BNG)
Bennington red phase (BNG.R)

(b) Imperfectly drained
Tavistock (TVK)
Tavistock red phase (TVK.R)

(c) Poorly drained
Maplewood (MPW)
Maplewood red phase (MPW.R)

VII. 40-100 cm sandy sediments over silty clay parent materials

(a) Well-drained
Bookton (BOO)
Bookton red phase (BOO.R)

(b) Imperfectly drained
Berrien (BRR)
Berrien red phase (BRR.R)

(c) Poorly drained
Wauseon (WUS)

VIII. Reddish-hued silty clay parent materials

(a) Imperfectly drained
Trafalgar (TFG)
Trafalgar loamy phase (TFG.L)

(b) Poorly drained
Morley (MOY)

IX. Heavy clay parent materials

(a) Moderately well-drained
Smithville (SHV)
Smithville loamy phase (SHV.L)

(b) Imperfectly drained
Haldimand (HIM)
Haldimand coarse phase (HIM.C)
Haldimand loamy phase (HIM.L)

(c) Poorly drained
Lincoln (LIC)
Lincoln coarse phase (LIC.C)
Lincoln loamy phase (LIC.L)

(d) Very poorly drained
Lincoln peaty phase (LIC.P)

X. Reddish-hued heavy clay parent materials

(a) Moderately well-drained
Ontario (OTI)

(b) Imperfectly drained
Niagara (NGR)
Niagara loamy phase (NGR.L)

(c) Poorly drained
Welland (WLL)
Welland loamy phase (WLL.L)

(d) Very poorly drained
Welland peaty phase (WLL.P)

XI. 40-100 cm loamy sediments over heavy clay parent materials

(a) Imperfectly drained
Tavistock heavy red phase (TVK.HR)

C. Soils Developed on Glaciofluvial Deposits

I. Reddish-hued coarse sandy loam and gravelly sand

(a) Rapidly drained
Fonthill (FNT)

(b) Imperfectly drained
Ridgeville (RVE)

D. Soils Developed on Eolian Deposits

I. Fine sand parent materials

(a) Rapidly drained
Plainfield (PFD)
Plainfield dune phase (PFD.D)

(b) Imperfectly drained
Walsingham (WAM)

E. Shallow Soils over Bedrock

I. Various parent materials less than 1 metre thick over mainly limestone and dolostone bedrock

(a) Rapidly drained
Farmington (FRM)
Farmington shallow phase (FRM.S)
Farmington very shallow phase (FRM.V)

(b) Imperfectly drained
Franktown shallow phase (FKW.S)
Franktown very shallow phase (FKW.V)

(c) Poorly drained
Brooke shallow phase (BOK.S)
Brooke very shallow phase (BOK.V)

II. Reddish-hued silty clay loam less than 1 metre thick over Queenston shale bedrock

(a) Imperfectly drained
Trafalgar shallow phase (TFG.S)

(b) Poorly drained
Morley shallow phase (MOY.S)

F. Soils Developed on Organic Deposits

I. Organic swamp sediments 40 - 160 cm over loamy mineral sediments

(a) Holly (HOY)

II. Organic fen sediments 40 - 160 cm over clayey mineral sediments

(a) Lorraine (LRR)

III. Organic swamp sediments 40 - 160 cm over clayey mineral sediments

(a) Quarry (QRY)

IV. Organic swamp sediments greater than 160 cm thick

(a) Portsmouth (PUH)

V. Organic fen sediments greater than 160 cm thick

(a) Port Colborne (PCE)

(b) Sherkston (SHK)

(c) Wainfleet (WAF)

G. Soils Developed on Recent Alluvial Deposits with Undifferentiated Drainage

I. Undifferentiated textures

(a) Alluvium 1 (1-ALU)

(b) Alluvium 1 very shallow phase (1-ALU.V)

II. Mainly sandy textures
(a) Alluvium 2 (2-ALU)
III. Mainly silt loam and loam textures
(a) Alluvium 3 (3-ALU)
IV. Mainly clay textures
(a) Alluvium 4 (4-ALU)

H. Miscellaneous Land Units

I. Landscape complexes
(a) Beach - scarp complex (CPX 1)
(b) Escarpment - floodplain complex (CPX 7)
(c) Escarpment (ESC)
(d) Marsh (MAR)
(e) Not Mapped (NM)

Table 4. Soils mapped in the Regional Municipality of Niagara and their areal extent

Map unit component name	Map unit component symbol	Total area (hectares)
Alluvium 1	1-ALU	5943
Alluvium 1 very shallow phase	1-ALU.V	57
Alluvium 2	2-ALU	9
Alluvium 3	3-ALU	54
Alluvium 4	4-ALU	89
Bennington	BNG	89
Bennington red phase	BNG.R	34
Berrien	BRR	568
Berrien red phase	BRR.R	6
Berrien till phase	BRR.T	138
Beverly	BVY	7891
Beverly coarse phase	BVY.C	87
Beverly loamy phase	BVY.L	4430
Beverly loamy red phase	BVY.LR	104
Beverly red phase	BVY.R	324
Bookton	BOO	20
Bookton red phase	BOO.R	13
Brady	BAY	38
Brady red phase	BAY.R	62
Brant	BRT	27
Brant red phase	BRT.R	556
Brantford	BFO	2604
Brantford loamy phase	BFO.L	19
Brantford loamy red phase	BFO.LR	3
Brantford red phase	BFO.R	151
Brooke shallow phase	BOK.S	919
Brooke very shallow phase	BOK.V	370
Cashel	CSH	779
Cashel heavy red phase	CSH.HR	131
Cashel red phase	CSH.R	16
Cashel washed phase	CSH.W	11
Chinguacousy	CGU	2024
Chinguacousy coarse phase	CGU.C	99
Chinguacousy loamy phase	CGU.L	1879
Chinguacousy loamy red phase	CGU.LR	829
Chinguacousy red phase	CGU.R	2848
Chinguacousy red washed phase	CGU.RW	358
Chinguacousy washed phase	CGU.W	429
Colwood	CWO	384
Colwood red phase	CWO.R	295

Table 4. Soils mapped in the Regional Municipality of Niagara and their areal extent (continued)

Map unit component name	Map unit component symbol	Total area (hectares)
Complex 1	CPX 1	183
Complex 7	CPX 7	41
Escarpment	ESC	743
Farmington	FRM	527
Farmington shallow phase	FRM.S	334
Farmington very shallow phase	FRM.V	1040
Flamborough	FMB	238
Flamborough brown phase	FMB.B	71
Fonthill	FNT	719
Fox	FOX	26
Fox red phase	FOX.R	169
Franktown shallow phase	FKW.S	785
Franktown very shallow phase	FKW.V	1084
Granby	GNY	66
Granby peaty red phase	GNY.PR	12
Grimsby	GMY	1200
Grimsby brown phase	GMY.B	37
Haldimand	HIM	12,112
Haldimand coarse phase	HIM.C	12
Haldimand loamy phase	HIM.L	569
Holly	HOY	105
Jeddo	JDD	2677
Jeddo loamy phase	JDD.L	1302
Jeddo loamy red phase	JDD.LR	221
Jeddo red phase	JDD.R	4125
Jeddo red washed phase	JDD.RW	153
Jeddo washed phase	JDD.W	95
Lincoln	LIC	19,029
Lincoln coarse phase	LIC.C	1
Lincoln loamy phase	LIC.L	160
Lincoln peaty phase	LIC.P	10
Lorraine	LRR	220
Malton	MAT	1262
Malton heavy phase	MAT.H	138
Malton heavy red phase	MAT.HR	3765
Malton loamy red phase	MAT.LR	138
Malton red phase	MAT.R	844
Maplewood	MPW	2647
Maplewood red phase	MPW.R	284
Maplewood till phase	MPW.T	45
Maplewood till red phase	MPW.TR	359
Marsh	MAR	87
Morley	MOY	324
Morley shallow phase	MOY.S	81
Niagara	NGR	3497
Niagara loamy phase	NGR.L	467
Not Mapped	NM	32,146
Oneida	OID	1096
Oneida loamy phase	OID.L	23
Oneida loamy red phase	OID.LR	4
Oneida red phase	OID.R	500
Oneida red washed phase	OID.RW	134
Oneida washed phase	OID.W	515
Ontario	OTI	188
Peel	PEL	1991
Peel coarse phase	PEL.C	5
Peel heavy phase	PEL.H	8
Peel heavy red phase	PEL.HR	1356
Peel loamy phase	PEL.L	125

Table 4. Soils mapped in the Regional Municipality of Niagara and their areal extent (continued)

Map unit component name	Map unit component symbol	Total area (hectares)
Peel loamy red phase	PEL.LR	186
Peel red phase	PEL.R	678
Plainfield	PFD	11
Plainfield dune phase	PFD.D	213
Port Colborne	PCE	91
Portsmouth	PUH	68
Quarry	QRY	597
Ridgeville	RVE	139
Sherkston	SRK	69
Silver Hill	SIH	9
Smithville	SHV	1713
Smithville loamy phase	SHV.L	105
Tavistock	TVK	1657
Tavistock heavy red phase	TVK.HR	3
Tavistock red phase	TVK.R	538
Tavistock till phase	TVK.T	501
Tavistock till red phase	TVK.TR	990
Toledo	TLD	15,613
Toledo coarse phase	TLD.C	66
Toledo loamy phase	TLD.L	6746
Toledo loamy red phase	TLD.LR	127
Toledo peaty phase	TLD.P	258
Toledo red phase	TLD.R	375
Trafalgar	TFG	156
Trafalgar loamy phase	TFG.L	118
Trafalgar shallow phase	TFG.S	369
Tuscola	TUC	163
Tuscola red phase	TUC.R	386
Vineland	VLD	2759
Vineland brown phase	VLD.B	45
Vittoria	VIT	38
Vittoria red phase	VIT.R	302
Wainfleet	WAF	212
Walsher	WSH	22
Walsingham	WAM	251
Wauseon	WUS	771
Welland	WLL	13,286
Welland loamy phase	WLL.L	758
Welland peaty phase	WLL.P	325

Soil Descriptions

This section contains generalized descriptions of the major soils in the Niagara Region. The descriptions are arranged in alphabetical order and include information on soil moisture characteristics, general soil characteristics, soil variability, and land use and management. Guidelines for most soil moisture characteristics were obtained from the CanSIS Manual (9). Estimates of water-holding capacity were extrapolated from water retention data in Volume 2 of the Niagara soil report.

Tables for each soil, with mean values for horizon depths, textures, pH, organic matter and $CaCO_3$ are in the Appendix of Volume 1 of the Niagara soil report. Similar tables, along with more detailed morphological, chemical and physical descriptions of typical soil profiles, as well as engineering test data, are presented in Volume 2 of the Niagara soil report.

Many soils described in this report have the same names as soils shown on the old Welland (1) and Lincoln County (2) soil maps. Although the two soils with the same name may be similar in many respects, they are not identical, due to differences in the scale of mapping and because of the necessity for defining more precise limits for soil characteristics, in the recent re-mapping of the Niagara Region. Hence, care should be taken to recognize differences between soils described on the old soil maps and soils with similar names on the new soil maps, such as the Vineland and Haldimand soils.

Alluvial Soils (ALU)

Soil Moisture Characteristics Alluvial soils have various drainage conditions, but most are imperfectly or poorly drained because of the close proximity of the water table to the ground surface for long periods each year. Additional wetness may be caused by flooding or by seepage of water from adjacent valley slopes. Permeability, water-holding capacity and surface runoff vary, depending on soil textures and horizon thicknesses.

General Soil Characteristics Because of recent flood deposition, surface horizons are usually fairly thick, with relatively high organic matter contents. The properties of subsoil horizons are quite variable because of the nature of deposition. It is not unusual to encounter buried surface horizons underlying recently deposited alluvium on which new surface horizons are developing. Soil classification is variable, with Regosols, Brunisols, and Luvisols occurring in the better-drained soils, and Humic Gleysols and Gleysols in poorly drained soils.

Soil Variability Surface horizons usually range between 20 and 30 cm in thickness and contain between 3 and 6 percent organic matter. Textures of both topsoil and subsoil are quite variable, both laterally and with depth. Soil reaction may vary from neutral in the topsoil to alkaline in the subsoil. Free carbonates are usually concentrated in the subsoil, but often still remain in the surface horizons of recently flooded soils.

Land Use/Management Comments Flooding is the greatest limitation of alluvial soils for agricultural uses. Most of the Alluvium 1 (1-ALU) soils which are subject to frequent flooding are Class 5I and are only suitable for grass forage crops without perennial legumes. Alluvium 1 shallow phase (1-ALU.V) soils are rated as Class 6R because of the shallowness of the soil materials over bedrock.

If flooding is less frequent, or restricted to early spring, the risks of growing spring grain, corn or soybeans are lower. Winter wheat and alfalfa, as well as spring grain, are commonly grown on some of the more extensive, older alluvial plains bordering water courses such as the Welland River and Twenty Mile Creek, because the incidence of flooding is minimal. Alluvium 2 (2-ALU), Alluvium 3 (3-ALU) and Alluvium 4 (4-ALU) soils usually occupy these areas. They are rated Class 3I.

In addition to flooding problems, alluvial soils may be limited by high water tables that cannot be artificially drained. Tillage problems also occur because of odd field shapes and steep valley slopes associated with meandering streams and rivers.

Bennington Soils (BNG)

Soil Moisture Characteristics Bennington soils are well-drained. They are usually moderately permeable through the upper loamy horizons, but permeability decreases, sometimes drastically at the subsoil clay contact. Water-holding capacities of Bennington soils are high. Surface runoff can also be high, increasing rapidly with slope.

General Soil Characteristics The Ap, Bm and Bt horizons are usually developed in the loamy soil materials that make up the upper part of these soils. Although thickness of these materials can range between 40 and 100 cm over clayey subsoil, the mean depth at which the clay begins is about 65 cm. A IIBt horizon usually occurs at the top of the clay materials and extends to a mean depth of about 85 cm where the calcareous IICk horizon begins. Soil classification is usually Brunisolic Gray Brown Luvisol.

Soil Variability Textures of the upper surface horizon vary from loam to silt loam, or very fine sandy loam. Underlying this loamy material, the clayey subsoil has silty clay or silty clay loam textures. Some Bennington red phase (BNG.R) soils were mapped where the clay subsoil had reddish hues. Bennington soils are most commonly associated with Tavistock (TVK) and Beverly loamy phase (BVY.L) soils on level to gently sloping upland areas. On moderate slopes, Bennington soils frequently merge into Brantford loamy phase (BFO.L) soils.

Land Use/Management Comments Bennington soils are rated no higher than Class 2M for common field crops because of a potential moisture deficit during part of the growing season. On steeper slopes the high erodibility of the surface loamy materials and topography result in capability Classes 3 to 5 designations. Suitability for all other crops, including field crops such as soybeans, tree fruits and vegetables also decrease as the slope increases. Suitability ranges from fair to good to good for most fruit and vegetable crops on level topography. Irrigation should be considered for the production of peaches, strawberries, green onions, potatoes, peppers and celery.

Berrien Soils (BRR)

Soil Moisture Characteristics Berrien soils are imperfectly drained. The surface sands are rapidly permeable but have relatively low water-holding capacities resulting in a possible problem of summer droughtiness. The underlying clayey materials are moderately to slowly permeable and, as a consequence, have layers of groundwater perched on them for periods of time each year. Berrien soils usually have slow surface runoff.

General Soil Characteristics The surface horizons of Berrien soils usually have very fine sandy loam or fine sandy loam textures. These include an Ap horizon that is usually about 20 cm thick and underlying B horizons that range from 40 to 100 cm deep over clayey soil materials. The clayey subsoil is usually composed of clay or silty clay textures. A weakly-cemented zone often occurs at the sand-clay contact zone. Distinct to prominent yellowish-brown mottles occur above and below this contact zone in both B and C horizons. The usual classification of Berrien soils is Gleyed Brunisolic Gray Brown Luvisol.

Soil Variability A small area of Berrien red phase (BRR.R) soils are mapped in the Pelham area. These are similar to normal Berrien soils except that the surface sands have reddish, rather than brownish hues. Berrien till phase (BRR.T) soils differ from normal Berrien soils, in that the clayey subsoil is derived from glacial till, rather than glaciolacustrine sediments. Consequently, it has higher bulk densities and clay loam textures. In the field, Berrien soils sometimes have inclusions of similar, but well-drained Bookton soils. Similar, but poorly drained Wauseon (WUS) soils, are often associated with Berrien soils on level terrain. Other soils that have been mapped with Berrien soils in Niagara are poorly drained Toledo coarse phase and loamy phase (TLD.C, TLD.L) and Lincoln loamy phase (LIC.L) soils.

Land Use/Management Comments Berrien soils are rated Class 1 and 2T for common field crops. Except for grain corn, they are mainly utilized for horticultural crops in the Niagara Region. Their suitability ranges from fair to good for most hardy tree fruits and small fruits. They are less suitable for the tender fruit crops. They have fair to good suitability for virtually all vegetable crops. Some tile drainage is necessary for any commercial horticultural use of Berrien soils. Irrigation should also be considered for production of strawberries, peaches, green onions and potatoes on Berrien soils. Maintenance of fertility and organic matter levels is also a prime consideration.

Beverly Soils (BVY)

Soil Moisture Characteristics Beverly soils are imperfectly drained. They are moderately to slowly permeable. Groundwater occupies the surface horizons for a period of time each year. This time period is longer for the Beverly soils with loamy and sandy caps. The saturation period is prolonged in many cultivated fields, where the subsoil has been overcompacted by heavy machinery. Water-holding capacity ranges from medium to high and surface runoff is moderate to high.

General Soil Characteristics Beverly surface horizons have a mean thickness of 17 cm, and a mean organic matter content of 3.6 percent. They are usually composed of silty clay loam textures. Subsoil horizons usually have silty clay textures and are frequently compacted. Distinct or prominent yellowish-brown to yellowish-red mottles are usually present in the upper subsoil B horizons, because of perched water tables. The calcareous C horizon usually begins at about the 45 cm depth. The pH values of the A and B horizons are usually in the neutral range of 6.2 to 6.3. Soil classification is commonly Gleyed Brunisolic Gray Brown Luvisol.

Soil Variability There are sizeable areas of Beverly loamy phase (BVY.L) soils, where surface horizons average 33 cm of silt loam or loam over clayey subsoil. In a few areas, a similar cap of sandy sediments overlies the clays resulting in Beverly corase phase (BVY.C) soils. In the southeastern part of the Region, Beverly soils with reddish hues occur, (BVY.R, BVY.LR), that are similar in all other respects to the normal Beverly soils. The usual landscape associates of Beverly soils are Brantford (BFO) and Toledo (TLD) soils. On the southern clay plains, Beverly soils often grade into Haldimand (HIM), or Niagara (NGR) soils.

Land Use/Management Comments Beverly soils are rated as Class 2D because of their high clay content which can result in soil structure problems if they are not carefully managed. They are used mainly for corn, small grains and forage crops. Near the Niagara Escarpment, they are sometimes used for hardier fruit crops like labrusca grapes, apples and pears. Because of subsoil compaction, tile and/or surface drainage is almost mandatory for successful yields of most crops. Erosion control is important too, because of the high susceptibility of Beverly surface horizons to water erosion, especially on the steeper slopes.

Bookton Soils (BOO)

Soil Moisture Characteristics Bookton soils are well-drained, and consist of rapidly permeable surface sands underlain by moderately to slowly permeable clays. The upper sandy horizons of these soils have relatively low water-holding capacities and may be droughty during dry summers. Surface runoff is slow on level to gently sloping Bookton soils, but increases on moderate and strong slopes.

General Soil Characteristics The upper sandy layers average about 45 cm in thickness over clayey subsoil. Surface Ap horizons have mean thicknesses of 15-20 cm. The soil in the sand-clay contact zone is often compacted and difficult to penetrate when dry. The calcareous C horizons have developed in silty clay loam or silty clay beginning at about the 45 cm depth. Soil classification is usually Brunisolic Gray Brown Luvisol.

Soil Variability Sandy textures are variable, but fine sandy loam and loamy fine sand seem most common. Reaction of the sands is neutral, with pH values usually ranging between 6.0 and 6.4. Some Bookton red phase (BOO.R) soils have been mapped, in which the sands have reddish hues. Bookton soils most commonly occupy level to gently sloping upland areas, where they are associated with Berrien (BRR) or Berrien red phase (BRR.R) soils. On moderate slopes, Bookton soils often merge into Brantford coarse phase (BFO.C) soils.

Land Use/Management Comments Bookton soils are rated as Class 2M for common field crops. Their capability for these crops decreases on steeper slopes. They are also suitable for most fruit and vegetable crops. Suitability ratings usually range from fair to good to fair for these crops. Their main limitation is a tendency for droughtiness in summer, so the availability of supplemental irrigation, especially for high value horticultural crops, is a prime requisite.

Brady Soils (BAY)

Soil Moisture Characteristics Brady soils are imperfectly drained because of groundwater levels that usually rise into subsoil horizons during the winter and spring. They are usually rapidly permeable and have relatively low water-holding capacities. Consequently, they may be droughty during dry summers. Brady soils have slow surface runoff.

General Soil Characteristics Surface Ap horizons usually consist of about 25 cm of loamy sand or sand over 45 to 65 cm of sandy B horizons. In Niagara, the lower B horizon usually contains a high proportion of fine sand. Calcareous C horizons usually occur at about 70 cm depth. Distinct to prominent reddish-yellow or dark yellowish-brown mottles are usually present below the 30 cm depth. Soil reaction is more acid in the A and B horizons, than in the alkaline C horizons. Soil classification is typically Gleyed Brunisolic Gray Brown Luvisol, but the few Brady soils that have been described in Niagara are mainly Gleyed Melanic Brunisols.

Soil Variability Organic matter contents of surface horizons range between 2 and 5 percent. Although textures are usually loamy sand or sand, fine sand textures are not unusual at depth. The pH values of the surface A and subsoil B horizons usually ranges between 5.5 and 6.5. Many of the Brady soils mapped below the Escarpment are Brady red phase (BAY.R) soils, that diff. from normal Brady soils by having mainly reddish hues. Brady soils often grade into Fox (FOX, FOX.R) or Grimsby (GMY) soils with increasing slope. In low areas, they merge into Granby (GNY) soils.

Land Use/Management Comments Brady soils are mainly used for growing fruit crops below the Escarpment, and in the Fenwick area. They are well-suited to tender fruit crops, provided that tile drainage and supplemental irrigation are provided. They are also suitable for most vegetable crops, and are used for this purpose in the Wainfleet area. Again, drainage and irrigation must be considered for vegetable crops, as well as maintenance of organic matter levels.

Brant Soils (BRT)

Soil Moisture Characteristics Brant soils are well-drained. They are usually moderately permeable, but the permeability decreases in horizons that are clayey or compacted. The water-holding capacities of Brant soils are fairly high. Surface runoff can be high, and increases markedly with slope.

General Soil Characteristics Surface Ap horizons usually consist of about 20 cm of loamy soil materials. These overlie 60-70 cm of B horizons with similar textures. A Bt horizons, with increased clay contents, is also usually present. The calcareous C horizons, that underlie the B horizons, are also loamy, and sometimes outcrop at the surface of severely eroded slopes. Because of the high erodibility of Brant soils, surface organic matter contents are relatively low, usually less than 3 percent. Generally, the reaction of the A and B horizons is moderately acid. Soil classification is usually Brunisolic Gray Brown Luvisol.

Soil Variability Textures of Brant soils range from loam and silt loam to very fine sandy loam. Alternate layering of these sediments, and occasionally more sandy or clayey layers, is typical of Brant soils. Brant red phase (BRT.R) soils, with reddish hues, are more plentiful in Niagara than typical Brant soils. They seem to have better-developed Bt horizons, and greater depth to C horizons, than normal Brant soils. Organic matter contents of all Brant surface horizons usually range between 2 and 3 percent. The pH values of the upper horizons tend to be low, sometimes less than 5.0, but usually between 5.5 and 6.0. On more level landscape positions, Brant soils often merge into imperfectly drained Tuscola (TUC) soils.

Land Use/Management Comments Brant soils are excellent agricultural soils, well-suited to a wide range of field and horticultural crops. They are most commonly used for corn and soybeans, in Niagara, and to a lesser extent for tree fruit and grape crops. They are highly susceptible to water erosion on slopes, resulting in lower organic matter in surface horizons on slopes. Erosion mitigation is the prime management concern on Brant soils. Care must also be observed during tillage operations, because of a tendency for these soils to overcompact under high moisture conditions.

Brantford Soils (BFO)

Soil Moisture Characteristics Brantford soils are moderately well-drained. They are moderately to slowly permeable, depending mainly upon the amount of subsoil compaction that has taken place. Where compaction is severe, groundwater may perch above the compacted zone for periods of time. Brantford soils have relatively high water-holding capacities, but can exhibit summer droughtiness. Surface runoff from Brantford soils is generally rapid.

General Soil Characteristics The surface Ap horizons of Brantford soils usually consist of 15-20 cm of silty clay loam textures. Mean organic matter is 3.7 percent, and mean pH is 6.4 in the surface horizons. Subsoil B horizons, of silty clay loam or silty clay textures extend down to about 50 cm where they contact the calcareous C horizons. Soil reaction ranges from neutral in the B horizons, to alkaline in the Ck horizons. Soil classification is usually Brunisolic Gray Brown Luvisol.

Soil Variability Brantford loamy phase (BFO.L) soils usually have 20-30 cm of silt loam or loam over the normal clayey Brantford soil materials. The loamy layer immediately underlying the surface Ap horizons, in these soils, can have acidic pH values. Brantford red phase (BFO.R) soils have reddish hues; otherwise their properties are similar to those of normal Brantford soils. On the landscape, Brantford soils most frequently merge into imperfectly drained Beverly (BVY) soils. In many areas, they are also closely associated with pockets and channels of poorly drained Toledo (TLD) and Lincoln (LIC) soils.

Land Use/Management Comments Brantford soils are mainly used for field crops in the Niagara Region. They are rated as Class 2D until topography becomes a limiting factor for management. Corn, soybeans, winter wheat and spring grains are the most common field crops grown on these soils. Some hardy fruit (apples, pears, plums) and grape crops are grown on Brantford soils near the Escarpment, especially on the Brantford loamy phase (BFO.L) soils. The greatest limitation of Brantford soils is structural degradation from overcompaction by heavy machinery. This can be a factor in causing summer droughtiness. Water erosion on slopes is also a hazard on these moderately erodible soils. The latter is especially a concern where Brantford loamy phase (BFO.L) soils exist.

Brooke Soils (BOK)

Soil Moisture Characteristics Brooke soils are poorly drained. They are usually moderately to slowly permeable in the Niagara Region. Because of groundwater ponding on the relatively impermeable bedrock, most of the Brooke soil horizons are usually saturated for long periods of time each year. In the Niagara Region, Brooke soils have fairly high water-holding capacities. Surface runoff is moderate on these soils.

General Soil Characteristics Brooke soils have surface horizons about 20 cm thick, with fairly high organic matter contents. Subsoil horizons contact mainly limestone and dolostone bedrock within one metre of the surface. In the Niagara Region, Brooke soils have mainly clayey textures. Gravel contents increase in the C horizons that directly overlie bedrock. The Brooke soils in the Niagara Region are most often classified as Orthic Luvic Gleysols.

Soil Variability The Brooke soils are subdivided into two phases in Niagara; Brooke shallow phase (BOK.S) soils, which have 50 to 100 cm of soil over bedrock; and Brooke very shallow phase (BOK.V) soils, with 20 to 50 cm of soil over bedrock. Textures are variable, ranging from loam to heavy clay, but most horizons have silty clay loam or silty clay textures. BOK.S soils seem to have more acidic pH values in the upper horizons than BOK.V soils. The most common inclusion, or associated soil is the Franktown (FKW) soil which is also shallow to bedrock, but imperfectly drained.

Land Use/Management Comments These soils are not suited for most agricultural uses because of the limiting combination of shallowness to bedrock and poor drainage. The BOK.S soils, which are rated as Class 4W, can be tile drained, and are used to some extent for forage and small grain crops. The BOK.V soils cannot usually be tile drained, so agricultural use is limited to pasture. Most BOK.V soils are idle or growing scrub forest. They are rated as Class 5W.

Cashel Soils (CSH)

Soil Moisture Characteristics Cashel soils are moderately well-drained and moderately to slowly permeable. Depending on the amount of subsoil compaction, groundwater may perch near the surface for brief periods of time. Cashel soils have relatively high moisture-holding capacities, but during dry periods droughtiness can be a problem. Surface runoff is generally rapid.

General Soil Characteristics Cashel soils have surface horizons between 15 and 20 cm thick, with silty clay loam textures. Silty clay loam or silty clay B horizons extend to a depth of 40 to 100 cm, where clay loam till occurs. The calcareous C horizon has developed in this clayey till. Cashel soils are usually classified as Orthic Gray Brown Luvisols.

Soil Variability Several Cashel soil phases have been mapped in the Niagara Region. Cashel red phase (CSH.R) soils are similar to normal Cashel soils except for reddish hues. Cashel heavy red phase (CSH.HR) soils also have reddish hues, but heavy clay textures are present in the upper, clayey lacustrine layers. Cashel washed phase (CSH.W) soils are found sparingly on the Vinemount Moraine. In these soils, the normally clayey subsoil has been modified by glacial lake action to produce a loamier, more gravelly till. Cashel soils often grade into imperfectly drained Peel (PEL) soils, as slopes become more subdued. Poorly drained Malton (MAT) soils sometimes occupy depressional areas next to Cashel soils.

Land Use/Management Comments Cashel soils are rated as Class 2D soils on level topography. They are used for common field crops such as fall wheat, corn and barley. Because Cashel soils occur mainly in the favourable climatic zones near the Escarpment, they are commonly used for grapes and hardier tree fruit crops and are rated as fair and fair to good. Dry season droughtiness, possible subsoil compaction and water erosion on slopes, are potential management constraints.

Chinguacousy Soils (CGU)

Soil Moisture Characteristics Chinguacousy soils are imperfectly drained. They are moderately to slowly permeable. In addition to regional groundwater fluctuations in the lower horizons, temporary groundwater occupies the surface horizons for time periods of each year. Chinguacousy soils have relatively high water-holding capacities. They have moderate to rapid surface runoff, increasing with slope.

General Soil Characteristics Normal Chinguacousy soils have a mean surface horizon thickness of about 20 cm and subsoil B horizons that extend to between 50 and 60 cm, where calcareous C horizons begin. Distinct to prominent yellowish-brown mottles occur in the subsoil B horizons. Textures are usually silty clay loam, occasionally clay loam or silty clay. Soil reaction of both surface A and subsoil B horizons is usually neutral. The usual classification is Gleyed Brunisolic Gray Brown Luvisol.

Soil Variability Many phases of the Chinguacousy soil have been mapped in the Niagara Region. Chinguacousy coarse phase (CGU.C) soils, have 15 to 40 cm of sandy sediments over clayey till, Chinguacousy loamy phase (CGU.L) soils, have similar depths of loamy material over the till. In the southeastern part of the Region, Chinguacousy red phase (CGU.R) soils are more common than normal. They have reddish hues and somewhat greater depths to free carbonates than the normal soils. Chinguacousy loamy red phase (CGU.LR) soils are often present on these reddish, clayey tills. Above the Niagara Escarpment, on the Vinemount Moraine, Chinguacousy washed phase (CGU.W) soils are mapped. These soils have loam or silt loam textures, because of glacial lake modification. Their counterparts in the reddish tills are the Chinguacousy red washed phase (CGU.RW) soils.

Land Use/Management Comments Chinguacousy soils are Class 2D soils because of high bulk densities, which can result in soil structure problems if they are not carefully managed. They are widely used for growing common field crops. In the vicinity of the Niagara Escarpment, grapes, apples, pears and plums are often grown on them, especially on the coarse, loamy and washed soil phases. Tile drainage is often necessary, especially where subsoil has been compacted. Care must be taken during machinery operations to avoid wet areas, because of the danger of overcompaction. Chinguacousy soils are also quite erodible, and as slopes increase, consideration of erosion control measures should also increase.

Colwood Soils (CWO)

Soil Moisture Characteristics Colwood soils are poorly drained and moderately to slowly permeable. Because of high groundwater tables, they usually remain saturated for relatively long periods of time each year. Colwood soils have high water-holding capacities. Surface runoff is usually slow.

General Soil Characteristics The surface horizons of Colwood soils have relatively high organic matter contents, and usually range between 20 and 25 cm in thickness. They are underlain by gleyed B horizons that commonly have distinct and prominent yellowish-brown mottles. Calcareous C horizons commence at depths ranging from 40 to 100 cm below the surface. Loamy textures occur in all Colwood soil horizons. Colwood soils are usually classified as Orthic Humic Gleysols.

Soil Variability The loamy textures of Colwood soils can include loam, silt loam or very fine sandy loam textures, often in alternating horizons. Occasional thin horizons of sandy or clayey sediments occur. Soil reaction of the A and B horizons is neutral with pH values usually ranging from 6.4 to 7.0. There are scattered occurrences of Colwood red phase (CWO.R) soils that are similar in most respects to normal Colwood soils, except for reddish hues and a tendency to be weathered more deeply to free carbonates. Normal Colwood soils are sometimes associated with poorly drained Maplewood (MPW) soils, where underlying clays occur within one metre of the surface. Also, they frequently merge into imperfectly drained Tuscola (TUC) soils. Colwood red phase soils can be associated with imperfectly drained Tuscola red phase (TUC.R), or Vineland (VLD) soils.

Land Use/Management Comments Colwood soils are rated as Class 2W for common field crops, if they are tile drained. When tiled, they are used intensively for grain corn, soybeans, and to a lesser extent, for small grain crops. They have fair suitability for most vegetable crops when tile drained. The Colwood soils in the Wainfleet area are used for this purpose. They appear to be less suitable for most fruit crops.

Farmington Soils (FRM)

Soil Moisture Characteristics Farmington soils are well-drained soils that usually have good permeability. Water-holding capacity is variable depending on texture, but because of the proximity of bedrock, summer droughtiness is usually a problem. Surface runoff varies depending on slopes and soil textures.

General Soil Characteristics Surface Ap horizons can range up to 20 cm thick over bedrock, or thin B horizons, that may or may not be present. Soil textures are usually loam or clay loam. Soil reaction is usually neutral. Soil classification is usually Orthic Melanic Brunisol.

Soil Variability Normal Farmington soils, with only 10 to 20 cm of soil over mainly limestone and dolostone bedrock, usually only have Ap soil horizons. Farmington very shallow phase (FRM.V) soils, with 20 to 50 cm of soil over bedrock, have both Ap and Bm horizons. Farmington shallow phase (FRM.S) soils, with 50 to 100 cm of soil over bedrock, have Ap, Bm and Bt horizons, and are usually classified as Luvisols. Although Farmington textures can vary from sandy loam to silty clay, loamy textures are most common. In the field, Farmington soils are sometimes intermixed with imperfectly drained Franktown (FKW.V, FKW.S) soils, and poorly drained Brooke (BOK.V, BOK.S) soils, that are also shallow to bedrock. Near the Niagara Escarpment, small patches of exposed bedrock are sometimes present in Farmington soil areas.

Land Use/Management Comments The normal Farmington soils have little agricultural value, because of the shallow bedrock and droughtiness limitations. Farmington very shallow phase soils have some limited use for forage, and occasional small grain crops. Farmington shallow soils can have droughtiness problems during dry seasons, but are otherwise fairly well-suited to most common field crops. They may also be used for grapes and small fruit crops, but will need supplemental irrigation.

Flamborough Soils (FMB)

Soil Moisture Characteristics Flamborough soils are poorly drained. They are moderately to rapidly permeable. Groundwater saturates the soils for varying periods each year. They have moderate to low water-holding capacities. Surface runoff is slow.

General Soil Characteristics The upper soil horizons usually extend to at least 80 cm before calcareous C horizons begin. Both B and C horizons are characterized by gley colours and distinct or prominent strong brown mottles. During dry periods, there is sometimes a tendency for an impermeable layer to form at the top of the mottled zone. Soil textures are usually very fine sandy loams. Soil classification is usually Orthic Humic Gleysol.

Soil Variability Although the most common texture of Flamborough soils is very fine sandy loam, other textures such as fine sandy loam, fine sand or loam, are not uncommon in the B and C horizons. The pH values of the A and B horizons usually range between 6.0 and 7.0. In the Wainfleet area, Flamborough brown phase (FMB.B) soils are found, without the reddish hues associated with the normal Flamborough soils. Vineland (VLD) and Vineland brown phase (VLD.B) soils are often intermixed with Flamborough soils, on sand plains, and in depressions.

Land Use/Management Comments If tile drained, Flamborough soils are quite suitable for most agricultural crops. Although they have Class 2W capability for common field crops, most drained Flamborough soils are used for growing vegetables in the Wainfleet area and for grapes and small fruits below the Niagara Escarpment. Suitability ratings, assuming tile drainage, for most vegetable crops are fair, and poor to fair for most fruit crops.

Fonthill Soils (FNT)

Soil Moisture Characteristics Fonthill soils are rapidly drained and rapidly permeable. They generally have low water-holding capacities, and as a result, can have droughtiness problems during dry periods. They have slow surface runoff, except on steeper slopes.

General Soil Characteristics Surface Ap horizons of Fonthill soils have a mean thickness of 24 cm, and a mean organic matter content of 2.1 percent. All subsoil horizons have reddish 7.5YR and 5YR hues. Subsoil B horizons usually extend more than 1 metre below the surface, before the calcareous C horizons begin. Fonthill soil horizons alternate between gravelly and sandy textures. Soil reaction of A and B horizons ranges from acid to neutral. The most common classification is Orthic Melanic Brunisol, although some are Eluviated Melanic Brunisols.

Soil Variability The main variable in Fonthill soils is texture, which ranges from sandy loam to gravelly loam. At least 12 percent gravel is present in all horizons. Slight concentrations of clay sometimes occur in the lower subsoil horizons. On the relatively level upland part of the Fonthill Kame, Fonthill soils sometimes grade into their imperfectly drained counterparts, the Ridgeville (RVE) soils, in depressions. Along the steeply sloping edges of the Kame, Fonthill soils are often associated with Grimsby (GMY) soils.

Land Use/Management Comments Fonthill soils are agricultural soils that are presently being used mainly for grape and tree fruit production. Sour cherries are the predominant fruit crop, but sweet cherries, peaches and the hardier tree fruits are also grown. Supplemental irrigation is helpful to increase most fruit crop yields because of the droughtiness limitations of Fonthill soils. Maintenance of organic matter and fertility are also important management considerations.

Fox Soils (FOX)

Soil Moisture Characteristics Fox soils are rapidly drained and rapidly permeable. They have relatively low water-holding capacities, and as a consequence, they usually always suffer from droughtiness limitations. Surface runoff is slow, except under saturated conditions on steeper slopes.

General Soil Characteristics Fox soils have surface Ap horizons averaging between 20 and 25 cm thick. B horizons usually extend deeper than 1 metre, to the calcareous C horizons. Soil reaction of the A and B horizons ranges from acid to neutral. The usual classification is Brunisolic Gray Brown Luvisol.

Soil Variability Fox soils in the Niagara Region are deeper to the C horizon than those mapped elsewhere. The wavy Bt horizons that usually overlie C horizons, are almost always greater than 1 metre depth. Fox red phase (FOX.R) soils have reddish hues, and also differ from the normal Fox soils in having higher fine sand contents and somewhat higher pH values. In level or depressional areas, Fox soils sometimes grade into imperfectly drained Brady (BAY), or Brady red phase (BAY.R) soils. They often merge into well-drained Grimsby (GMY) soils that have higher contents of fine and very fine sand than Fox soils.

Land Use/Management Comments Fox soils are used almost exclusively for fruit crops. Suitability ratings are usually fair and fair to good, but with irrigation they increase to good. They are particularly well-suited to the deeper rooted tender fruit crops like sweet cherries. Because of droughtiness limitations, irrigation is a necessity for virtually all fruit crops. Maintenance of suitable organic matter and fertility levels is a prime consideration in Fox soils.

Franktown Soils (FKW)

Soil Moisture Characteristics Franktown soils are imperfectly drained and usually moderately permeable. The lower soil horizons are usually temporarily saturated by groundwater ponding on the bedrock in these shallow soils. The water-holding capacity of these soils is usually moderate to high.

General Soil Characteristics Normal Franktown soils, that have 10 to 20 cm of soil over mainly limestone and dolostone bedrock, are not mapped in the Niagara Region. Deeper soil phases, in which soil depth ranges from 20 to 100 cm over bedrock, are present in mappable amounts. In these Franktown soils, surface Ap horizons range from 18 to 24 cm deep, and have mean organic matter contents of about 4.3 percent. Subsoil B horizons usually have distinct yellowish-brown mottles, and loam or clay loam textures. Soil reaction of both A and B horizons is in the neutral range. Soil classification varies from Gleyed Brunisolic Gray Brown Luvisol to Gleyed Melanic Brunisol.

Soil Variability The two Franktown soils that are mapped in the Niagara Region, are the Franktown shallow phase (FKW.S), and Franktown very shallow phase (FKW.V) soils. Franktown shallow phase soils have 50 to 100 cm of soil over bedrock and are sometimes associated with Farmington very shallow phase (FRM.V) soils, as well as with

poorly drained Brooke shallow phase (BOK.S), and very shallow phase (BOK.V) soils. Franktown shallow phase soils are usually classified as Gleyed Brunisolic Gray Brown Luvisols. Franktown very shallow phase soils have 20 to 50 cm of soil over bedrock, and often merge into Franktown shallow phase soils. They are also often associated with well-drained Farmington (FRM) soils. Franktown very shallow phase soils are usually classified as Gleyed Melanic Brunisols.

Land Use/Management Comments Franktown soils may be used for general field crops, but their suitability varies according to the thickness of soil over bedrock. Franktown very shallow phase (FKW.V) soils, which are rated Class 4R, are most suitable for forage crops. Franktown shallow phase (FKW.S) soils, which are rated Class 3R because of the greater soil depths, can be tile drained if necessary, and used for small grain crops, as well as for forage crops. Franktown soils are unsuitable for tree fruit crops, but have limited suitability for small fruits and grapes. Similarly, the deeper Franktown soils have some suitability for most vegetable crops.

Granby Soils (GNY)

Soil Moisture Characteristics Granby soils are poorly drained. Because of their sandy textures, they are usually rapidly permeable. Most subsoil horizons are saturated by groundwater for long periods each year, unless artificially drained. They have relatively low water-holding capacities and slow surface runoff.

General Soil Characteristics Granby soils have surface Ap horizons about 20 cm thick, with relatively high organic matter contents. Subsoil B horizons usually extend to at least 75 cm before ending at calcareous C horizons. Both B and C horizons are usually characterized by the presence of prominent, dark yellowish-brown mottles. Textures of loamy sand or sandy loam usually predominate. Soil classification is usually Orthic Humic Gleysol.

Soil Variability In the Port Colborne area, some Granby peaty phase (GNY.P) soils are mapped in association with organic soils. They differ from normal Granby soils by being very poorly drained, and having a surface organic horizon. Granby soils often merge into imperfectly drained Brady (BAY) soils.

Land Use/Management Comments If Granby soils are artificially drained, they are good soils for most vegetable crops; Class 2W for general field crops; and have poor to fair suitability for fruit crops. Regardless of crops grown, fertility must be maintained in these sandy soils.

Grimsby Soils (GMY)

Soil Moisture Characteristics Grimsby soils are usually well-drained and quite permeable. They have medium to low water-holding capacities. Surface runoff is generally slow but increases with slope.

General Soil Characteristics Surface Ap horizons average about 25 cm thick, and have about 2 percent organic matter. Subsoil B horizons often extend deeper than one metre in depth to the calcareous C horizons. Most Grimsby soils have reddish hues, because of the influence of Queenston shale, and textures of very fine sandy loam or loamy fine sand. Soil classification is Brunisolic Gray Brown Luvisol.

Soil Variability The textures of Grimsby soils range from very fine sandy loam, usually in the surface horizons, to fine sandy loam or loamy fine sand in the subsoil horizons. Bt horizons usually extend to depths that are often greater than one metre. A and B horizons range from acid to neutral in reaction. Grimsby brown phase (GMY.B) soils differ from the normal Grimsby soils in colour only. Grimsby soils are often found in close landscape association with imperfectly drained Vineland (VLD) and Brady (BAY) soils, and less often with poorly drained Flamborough (FMB), Flamborough brown phase (FMB.B), Colwood red phase (CWO.R) and Maplewood red phase (MPW.R) soils.

Land Use/Management Comments Grimsby soils are prime soils for tender fruit crops, but below the Niagara Escarpment, only a remnant has not yet been urbanized. They are quite suitable for virtually all fruit and vegetable crops, but because of inherent droughtiness limitations, require sprinkler or trickle irrigation. Like other sandy soils, close attention must be paid to the maintenance of optimum organic matter, pH and fertility levels.

Haldimand Soils (HIM)

Soil Moisture Characteristics Haldimand soils are imperfectly drained and slowly permeable. In addition to high seasonal groundwater levels, there is usually some temporary perching of groundwater in the upper horizons of Haldimand soils every year. Haldimand soils have medium to high water-holding capacities, but can be droughty during dry periods because of water retention by the clayey soil materials. Surface runoff is usually rapid, except where the surface is dry and occupied by numerous soil cracks.

General Soil Characteristics The thickness of surface horizons of Haldimand soils averages about 15 cm. The underlying B horizons usually extend to a depth of about 35 cm where the calcareous C horizons begin. Surface textures are usually silty clay or clay, whereas lower B and C horizon textures are almost always heavy clay. B and C horizons normally have angular blocky or prismatic structures, and distinct to prominent mottles, ranging from dark yellowish-brown to strong brown in colour. Soil reaction of the surface horizons is usually in the neutral range. The usual classification is Gleyed Brunisolic Gray Brown Luvisol.

Soil Variability The only Haldimand soil phases, in the Niagara Region, are the Haldimand coarse phase (HIM.C) and Haldimand loamy phase (HIM.L) soils. The former soils have 15 to 40 cm of sandy sediments over the clayey soil materials, while the latter soils have 15 to 40 cm of loamy sediments over clays. The pH values of the surface horizons usually range between 5.7 and 6.3. The most common landscape associates of Haldimand soils are the poorly drained Lincoln soils, which also have heavy clay textures within their profiles.

Land Use/Management Comments Haldimand soils are rated Class 3D for common field crops, because of their high clay contents. They are capable of producing acceptable yields if certain precautions are taken, such as tile drainage of wet spots, minimizing compaction from heavy machinery use on wet soils, and prevention of erosion. Haldimand soils are unsuitable for growing most horticultural crops.

Holly Soils (HOY)

Soil Moisture Characteristics Holly soils are very poorly drained. They are rapidly permeable, but saturated by groundwater most of the time. They have high water-holding capacities and very slow surface runoff.

General Soil Characteristics Holly soils are organic soils in which the organic layers extend to depths of 40 to 160 cm over mineral soil. In the Niagara Region, Holly soils consist of mesic organic materials to a mean depth of approximately 100 cm. The mean organic matter content of these organic layers ranges from 71 to 84 percent and the pH varies from 5.5 to 5.7. The underlying mineral B horizon extends to a mean depth of 115 cm where the calcareous C horizon begins. Soil classification is usually Terric Mesisol.

Soil Variability The nature of the organic materials ranges from woody forest peat to sedge fen peat. The textures of the underlying mineral soil usually vary from silt loam to silty clay loam. Holly soils occur to a limited extent in the Niagara Region. They have been mapped south of the Onondaga Escarpment, and in combination with the peaty red phase of the Granby soil (GNY.PR) in an area west of the Fonthill Kame.

Land Use/Management Comments Most Holly soils are associated with forested wetland areas. Extensive clearing and drainage would be necessary before these soils could be used for agriculture. In addition, it would be helpful to have a method of controlling the subsurface water level, following drainage, in order to prevent erosion by wind of the surface organic horizon. Assuming tile drainage is in place, Holly soils are rated Class 3H-4H for common field crops according to the capability classification for organic soils. They are unsuitable for fruit crops. Vegetable crops, such as broccoli, onions, potatoes and celery are rated fair to good, on drained Holly soils.

Jeddo Soils (JDD)

Soil Moisture Characteristics Jeddo soils are poorly drained and slowly permeable. They are saturated by groundwater most of the year. During the growing season, the water table often goes down below 1 metre depth, especially if tile drainage is in place. Temporary perching of water on B horizons is a common problem, where compaction is serious, and especially when the surface horizons consist of loamy or sandy materials. Surface runoff is moderate to rapid, depending on slope.

General Soil Characteristics Jeddo soils have surface horizons between 15 and 20 cm thick, with organic matter contents usually greater than 4 percent. The subsoil B horizons usually contact the calcareous C horizons between 40 and 50 cm from the surface. Soil textures are usually clay loam, although clay accumulations just above the C horizon sometimes result in Bt horizons with clay textures. Prominent yellowish-brown or strong brown mottles are common in all B and C horizons. High bulk densities are a feature of these till soils, most notably in the lower B and C horizons. Jeddo soils are usually classified as Humic Luvic Gleysols.

Soil Variability Many Jeddo soil phases have been mapped in the Niagara Region. The most extensive are the Jeddo red phase (JDD.R) soils, which occur below the Niagara Escarpment and in the Fort Erie and Port Colborne areas. Jeddo loamy phase (JDD.L) and loamy red phase (JDD.LR) soils have 15 to 40 cm of loamy sediments over the normal clayey till and reddish clayey till, respectively. Jeddo washed till phase (JDD.W) and Jeddo red washed phase (JDD.RW) soils occur where glacial lake action has modified the clayey till to loamier textures, near the Niagara Escarpment. The most common soils found as soil inclusions with Jeddo soils are the imperfectly drained Chinguacousy (CGU) soils and their various phases; Chinguacousy red phase, loamy phase, and loamy red phase (CGU.R, CGU.L, CGU.LR). In addition, Tavistock till phase (TVK.T), and red till phase (TVK.RT) soils are often inclusions in Jeddo loamy phase soil areas. Jeddo soils are sometimes associated with poorly drained Malton (MAT) soils in a few low areas.

Land Use/Management Comments If Jeddo soils are tile drained, they are capable of growing a wide range of field crops. They are rated as Class 3W because they may have excess water in the soil profile for part of the year. Many of the tiled Jeddo soils, north of the Niagara Escarpment, are in the fruit belt, and are used fairly extensively for grapes. There are also some apples, pears and plums grown commercially on drained Jeddo soils, particularly on the loamy and washed phases. These crops have poor to fair suitability when they are tiled. In addition to tile drainage, overcompaction is a serious management concern of these soils, and should be carefully monitored.

Lincoln Soils (LIC)

Soil Moisture Characteristics Lincoln soils are poorly drained and usually slowly permeable. Groundwater occupies the surface and upper subsoil horizons for long periods each year. Although Lincoln soils have high water-holding capacities, they can be droughty during dry periods because of insufficient moisture release for plant use. Surface runoff can be slow to rapid, depending on the incidence of soil cracks.

General Soil Characteristics Surface horizons have mean thicknesses of 15 cm, and mean organic matter contents of 5 percent. Subsoil Bg horizons have organic matter contents between 1 and 2 percent. They extend from 40 to 60 cm in depth, where they contact calcareous C horizons. Textures of surface horizons are usually clay or silty clay, whereas lower horizons consist of heavy clay at least 15 cm in thickness. Both B and C horizons have prominent mottles with yellowish-brown to dark yellowish-brown colours. They also typically have angular blocky or prismatic structures, which have often been degraded by machinery compaction to massive structures. Soil reaction of A and B horizons of most Lincoln soils usually ranges between pH values 5.7 and 6.4. A significant proportion have acidic values of 5.5 or less. Soil classification is usually Orthic Humic Gleysol.

Soil Variability A significant proportion of the Lincoln soils are Lincoln loamy phase (LIC.L) soils. They have 15 to 40 cm of silt loam or silty clay loam, over heavier clayey subsoil. There are a few small areas of Lincoln coarse phase (LIC.C) soils that have 15 to 40 cm of sandy sediments over heavy clay. Lincoln peaty phase (LIC.P) soils, with 15 to 40 cm of organic soil over clayey subsoil, also occupy some relatively small areas in association with Welland loamy phase (WLL.L) soils. Most inclusions or associated soils are imperfectly drained Haldimand and Haldimand loamy phase (HIM, HIM.L) soils, or moderately well-drained Smithville (SHV) soils.

Land Use/Management Comments Although Lincoln soils are presently being used for common field crops, such as forages, small grains and corn, they are usually considered

as problem soils because of their poor drainage and high clay contents. Thus they are rated as Class 3WD for common field crops. Some drainage improvement is necessary, but the benefits of systematic tile drainage are still somewhat debatable. It is important to avoid degradation of the soil structure of Lincoln soils, as much as possible, by not using heavy machinery on wet soils. Such degradation increases wetness problems and can increase summer droughtiness. Lincoln soils are unsuitable for most horticultural crops.

Lorraine Soils (LRR)

Soil Moisture Characteristics Lorraine soils are very poorly drained. They are rapidly permeable, but saturated by groundwater most of the time. They have high water-holding capacities and very slow surface runoff.

General Soil Characteristics Lorraine soils are organic soils in which the organic layers extend to depths of 40 to 160 cm over mineral soil. In the Niagara Region, Lorraine soils consist of mesic organic materials to a mean depth of approximately 70 cm. The mean organic matter content of the organic layers ranges from 73 to 80 percent, and the pH varies from 4.8 to 5.0. The underlying mineral B horizons extend to a depth below the lower inspection depth and therefore a C horizon was not generally described. Soil classification is usually Terric Mesisol.

Soil Variability The nature of the organic materials ranges from woody fen peat to sedge fen peat. The textures of the mineral subsoil vary from silty clay loam, to silty clay and clay. Lorraine soils occur, to a limited extent, in very poorly drained areas on the Fort Erie-Port Colborne map sheet. They have been mapped in association with the Portsmouth (PUH) organic soils and as a single component map unit.

Land Use/Management Comments Most Lorraine soils are associated with fens and forested wetland areas. Extensive clearing and drainage is necessary before these soils can be used for agriculture. In addition, it would be helpful to have a method of controlling the subsurface water level, following drainage, in order to prevent erosion by wind of the surface organic horizon. Assuming tile drainage is in place, Lorraine soils are rated Class 2FHL-3FH for common field crops according to the capability classification for organic soils. They are unsuitable for fruit crops. Vegetable crops, such as broccoli, onions, potatoes and celery are rated fair to good, on drained Lorraine soils.

Malton Soils (MAT)

Soil Moisture Characteristics Malton soils are poorly drained and slowly permeable. They are usually saturated by groundwater for long periods of the year. Perched water tables commonly occur above the compact subsoil till, and can remain into the growing season. Malton soils have relatively high water-holding capacities, and slow surface runoff.

General Soil Characteristics Malton soils have surface Ap horizons, that are usually about 20 cm thick, containing 5 to 6 percent organic matter. The mean depth of subsoil B horizons is 45 cm, where the calcareous C horizons begin. The glaciolacustrine soil materials of the A and B horizons have silty clay loam or silty clay textures, while the underlying glacial till of the C horizons usually has clay loam textures. Prominent yellowish-brown mottles commonly occur in both B and C horizons, but are especially noticeable in B horizons, above the compacted till contact zone. Malton soils are usually classified as Orthic Humic Gleysols.

Soil Variability Several phase variations of Malton soils have been mapped in the Niagara Region. The Malton heavy clay phase (MAT.H) soils have heavy clay layers within the A and B horizons. Malton red phase (MAT.R) soils have 40 to 100 cm of reddish-hued silty clay or silty clay loam, overlying glacial till. Malton loamy red phase (MAT.LR) soils are similar, except that 15 to 40 cm of reddish-hued loamy sediments overlie the clayey subsoil. Malton heavy red phase (MAT.HR) soils have surface clays with reddish hues, but also heavy clay layers. All Malton soils have inclusions, or associated areas, of imperfectly drained Peel (PEL) soils. The reddish-coloured Malton soils may also be associated with poorly drained Welland (WLL) and Jeddo red phase (JDD.R) soils.

Land Use/Management Comments Malton soils, if tile drained, are Class 3W for common field crops because they may have excess water in the soil profile for a part of the growing season. Most Malton soils that occur north of the Niagara Escarpment are used for growing grapes, and in some cases, hardy tree fruit crops, such as apples or pears. They have poor to fair suitability ratings for these crops when artificially drained, a practice which is recommended for all Malton soils. Care must be taken to stay off these soils with heavy machinery, when they are wet, in order to minimize soil compaction.

Maplewood Soils (MPW)

Soil Moisture Characteristics Maplewood soils are poorly drained and usually slowly permeable. High groundwater levels are often present in these soils, sometimes extending into the growing season. High perched groundwater levels are caused by the relatively dense clay subsoil. Maplewood soils have high water-holding capacities and moderate to slow surface runoff.

General Soil Characteristics Maplewood soils have surface Ap horizons, usually ranging between 20 and 30 cm thick, with mean organic matter contents of about 4 percent. Subsoil B horizons are developed in the loamy sediments, and sometimes in the underlying clayey materials. Calcareous C horizons occur in the clayey subsoil at depths greater than 40 cm. Thicknesses of loamy sediments over clays range from 40 to 100 cm. Prominent subsoil mottles, with strong brown to dark yellowish-brown colours, occur throughout the subsoil. The usual classification is Orthic Humic Gleysol.

Soil Variability Maplewood soils have several phase variations. One of the most extensive is the Maplewood till phase (MPW.T) soil, which differs from the normal Maplewood soils in having clayey till, rather than clayey lacustrine subsoil, at depths of 40 to 100 cm below the surface. In a few areas the surficial loamy sediments have reddish hues and are mapped as Maplewood red phase (MPW.R), and Maplewood till red phase (MPW.TR) soils. The most frequent inclusions and associates of Maplewood soils in the field are the imperfectly drained Tavistock soils including the red phase and till red phase soils (TVK, TVK.R, TVK.TR), and the poorly drained Toledo loamy phase (TLD.L) and Colwood (CWO) soils.

Land Use/Management Comments Maplewood soils require artificial drainage before they can be used productively for agriculture. When drained, level areas are rated as Class 2W for common field crops, and considered to have

good suitability for soybeans and canola. Drained Maplewood soils have fair to good suitability for most vegetable crops, and fair suitability for small fruit, grape and hardy tree fruit crops. Care must be taken to keep off wet Maplewood soils with heavy machinery, because of high susceptibility for compaction of the loamy subsoil.

Morley Soils (MOY)

Soil Moisture Characteristics Morley soils are poorly drained. They are usually slowly permeable, but during the dry summer periods, when cracks develop in the surface materials, permeability increases. Water tables are high in these soils, except during the summer and early fall seasons, when they are lower. They tend to remain high longer, when the shale bedrock is within one metre of the ground surface. Morley soils have high water-holding capacities and moderate to high surface runoff.

General Soil Characteristics The surface horizons of Morley soils average about 20 cm thick and have 4 percent organic matter. They overlie B horizons that range in depth from 50 to 90 cm to the calcareous C horizons. Both B and C horizons have distinct reddish hues, derived from the underlying Queenston shale, that become redder with depth. Distinct to prominent mottles are also common throughout Morley soils, with reddish-brown to yellowish-red colours. In soil layers immediately overlying shale bedrock, greenish bands are not uncommon, apparently deriving from greenish shale layers. Textures range from silty clay in the surface horizons, to silty clay loam and silt loam in lower subsoil horizons. Bulk densities usually increase with depth, attaining maximum values of 1.8 just above bedrock. The usual classification is Orthic Humic Gleysol.

Soil Variability In addition to the many colour variations in these soils there can also be wide variations in texture. Surface textures are usually silty clay or silty clay loam, and usually lighten with depth, although occasional thin layers of clay or heavy clay may occur. A common variation of the normal Morley soils are the Morley shallow phase (MOY.S) soils, in which red Queenston shale bedrock occurs at a depth of 50 to 100 cm from the soil surface. Trafalgar soils (TFG, TFG.S), which are imperfectly drained, but similar to Morley soils, are frequently inclusions in, or associated with Morley soils.

Land Use/Management Comments Morley soils require tile drainage before they are suitable for agricultural use. Because of their location below the Niagara Escarpment, and in a favourable climatic zone for fruit crops, drained Morley soils are used exclusively for growing grapes and hardy tree fruits. These crops have poor to fair suitability. Care must be taken to avoid planting fruit trees on Morley shallow phase (MOY.S) soils, because of impedance to root growth by bedrock.

Niagara Soils (NGR)

Soil Moisture Characteristics Niagara soils are imperfectly drained and moderately to slowly permeable. Their groundwater levels are usually close to the surface until late spring. They have moderate to high water-holding capacities. Surface runoff ranges from slow, on level topography, to rapid on slopes.

General Soil Characteristics The surface horizon of Niagara soils usually ranges between 15 and 20 cm thick, with an average organic matter content of 3.8 percent. Subsoil B horizons extend to the calcareous C horizon at depths 40 to 60 cm below the surface. Surface horizon texture of Niagara soils ranges from clay loam to clay. Subsoil textures consist of at least 15 cm of heavy clay, and occasional layers of clay. Niagara soils have reddish hues and prominent brown to strong brown mottles in the B and C horizons. Soil structure is usually columnar or prismatic, becoming massive when compacted by heavy machinery. Surface cracking is common during dry summer periods. Soil classification is usually Gleyed Gray Brown Luvisol.

Soil Variability The only Niagara soil phase that was mapped was the Niagara loamy phase (NGR.L), consisting of 15 to 40 cm of loamy sediments over clayey subsoil. Although pH values of the A and B horizons usually range between 6.0 and 6.8, a significant minority of these horizons have pH values of 5.5 or lower. The soil most often found as an inclusion within, or associate of Niagara soils is the similar, but poorly drained Welland (WLL) soil.

Land Use/Management Comments Artificial drainage of wet spots is usually necessary, before Niagara soils can attain their potential capability for field crop production. They are rated Class 3D because of their high clay contents. Drainage is also required before fair suitabilities are attained for special field crops, such as soybeans or canola. Their suitability is poor for most horticultural crops. With systematic drainage, they have poor to fair suitabilities for labrusca grapes, apples, pears and plums. The use of heavy machinery on Niagara soils, when they are too wet, has resulted in severe subsoil compaction, in some areas. Erosion of topsoil on slopes is also a continuing problem, because of exposure of heavier, poorer quality subsoil at the surface.

Oneida Soils (OID)

Soil Moisture Characteristics Oneida soils are moderately well-drained and moderately to slowly permeable. Groundwater, derived from seepage or runoff, may occupy the surface horizons for brief periods during the growing season. Oneida soils have relatively high water-holding capacities, but fairly rapid surface runoff can occur on slopes, and droughty conditions can develop.

General Soil Characteristics The mean thickness of Oneida surface horizons is about 20 cm. The mean organic content of Oneida Ap horizons was 2.4 percent. Subsoil B horizons usually range to between 50 and 60 cm depth below the surface. The lower part of the B horizon usually consists of a well-developed, wavy Bt horizon. Soil textures are usually clay loam, sometimes silty clay loam. The usual soil classification is Brunisolic Gray Brown Luvisol.

Soil Variability Several Oneida soil phases have been mapped in the Niagara Region. The Oneida loamy phase (OID.L) soil consists of 15 to 40 cm of loamy sediments over clayey till. Some Oneida red phase (OID.R) soils occur with reddish-hued clay loam till. These may have 15 to 40 cm of loamy sediment overlying the till, in which case, they are mapped as Oneida loamy red phase (OID.LR) soils. Oneida washed phase (OID.W) soils, which have been modified by glacial lake action, are fairly common on the Vinemount Moraine. They usually have loam textures. Also, in the vicinity of the Niagara Escarpment, there are some Oneida red washed phase (OID.RW) soils, which are similar to the OID.W soils, except for the reddish hues of the loamy till. On gently sloping to level landscapes, Oneida soils often merge into similar, but imperfectly drained Chinguacousy (CGU, CGU.L, CGU.R, CGU.W) soils. On level to slightly

hummocky landscapes, poorly drained Jeddo (JDD, JDD.L, JDD.R, JDD.W) soils are sometimes associated with Oneida soils.

Land Use/Management Comments Oneida soils are rated Class 2D soils on level topography because of high bulk density, which can result in soil structure problems if they are not carefully managed. They are used for growing all common field crops. In the vicinity of the Niagara Escarpment, grapes, apples, pears and plums are often grown on them, especially on the coarse, loamy and washed soil phases. Suitability ratings of Oneida soils range from good for pears and plums, to fair for vinifera grapes. These soils are quite erodible, especially on steeper slopes, where management practices should be undertaken to reduce the erosion risk.

Ontario Soils (OTI)

Soil Moisture Characteristics Ontario soils are moderately well-drained, and moderately to slowly permeable. Permeability decreases as compaction increases from heavy machinery use. Ontario soils have moderate to high water-holding capacities. Surface runoff is usually fairly rapid, and increases as slopes become steeper.

General Soil Characteristics Surface horizons have a mean thickness of 15 cm, and a mean organic matter content of 3.8 percent. The underlying subsoil B horizons usually extend to a depth of 35 to 45 cm below the surface, where they merge into calcareous C horizons. The pH of the A and B horizons usually ranges between 5.8 and 7.2, although there were a few pH values higher than 7.4 and some lower than 5.5. Ontario soils have distinct reddish hues and dominantly heavy clay textures. Occasional layers of clay or silty clay occur, especially at the surface. Soil classification is usually Orthic Gray Brown Luvisol.

Soil Variability The areal extent of Ontario soils is limited in the Niagara Region to the Fort Erie-Port Colborne area. Inclusions of similar, but imperfectly drained Niagara (NGR) soils, are fairly common in the field.

Land Use/Management Comments Ontario soils are rated Class 3 and lower for common field crops depending on the associated slopes. Their main limitation is the high clay contents that lead to tillage and compaction problems. They have fair to good suitability for canola, soybeans and white beans. They have fair suitability for a few horticultural crops, namely cole crops, tomatoes, pears and plums. Water erosion is a significant problem on slopes greater than 3 percent.

Peel Soils (PEL)

Soil Moisture Characteristics Peel soils are imperfectly drained. They are moderately to slowly permeable. Perched groundwater tables are a common occurrence in the upper horizons. They exist because of tillage compaction and dense clay loam till subsoil. The water-holding capacity of Peel soils ranges from medium to high. Water runoff is also medium to high, increasing as slopes become steeper.

General Soil Characteristics The Peel soils that have been sampled in the Niagara Region have surface Ap horizons averaging about 20 cm in thickness. They are underlain by B horizons that have developed partly in lacustrine clay, and partly in clay loam till. Calcareous C horizons begin in the till, at depth ranging from 50 to 65 cm below the surface. Textures of the surficial 40 to 100 cm of lacustrine sediment are usually silty clay loam or silty clay. The underlying till materials usually have clay loam or silty clay textures, and higher bulk densities than the overlying clays. Distinct yellowish-brown mottles occur throughout the B and C horizons. The usual classification is Gleyed Brunisolic Gray Brown Luvisol.

Soil Variability A number of phases of Peel soils have been mapped in the Region. Peel coarse phase (PEL.C) soils have 15 to 40 cm of sandy sediments over clay loam till. Peel loamy phase soils (PEL.L) soils have 15 to 40 cm of loamy sediments overlying till. Peel red phase (PEL.R) soils have 40 to 100 cm of reddish-hued lacustrine clay sediments over the till. Peel heavy clay red phase (PEL.HR) soils are similar, except that most of the upper reddish-hued sediment is composed of heavy clay textures. Peel loamy red phase (PEL.LR) soils have 15 to 40 cm of reddish-hued loamy sediments overlying the clayey subsoil. Peel heavy clay phase (PEL.H) soils have 40 to 100 cm of mainly clay sediments over clayey till. The most common inclusions and associates of Peel soils are the similar, but poorly drained, Malton (MAT, MAT.HR, MAT.LR, MAT.R) soils. The similar, but moderately well-drained Cashel (CSH) soils, can be found in a few areas with Peel soils. The poorly drained Welland (WLL) and Toledo (TLD) soils are also found in association with Peel soils, in some areas.

Land Use/Management Comments Peel soils are Class 2D for common field crops because the high bulk density of the subsoil can result in soil structure problems. With artificial drainage they have fair to good suitability for fruit crops such as grapes, apples, pears, plums, currants and gooseberries. Similar suitabilities prevail for vegetable crops such as peppers, cucumbers, tomatoes, cole crops, sweet corn and squash. At the present time, grapes are grown on many of the Peel soils occupying the Bench and Vinemount Moraine areas adjacent to the Niagara Escarpment. In addition to the need for some artificial drainage, Peel soils are susceptible to soil compaction and erosion and should be managed to minimize these potential problems.

Plainfield Soils (PFD)

Soil Moisture Characteristics Plainfield soils are rapidly drained and rapidly permeable. They have low water-holding capacities, so droughtiness is a yearly crop limitation. Surface runoff is slow on level areas, but increases as slopes become steeper.

General Soil Characteristics The Plainfield soils that were sampled in the Niagara Region have an average surface horizon thickness of 15 cm. Subsoil B horizons have developed to a depth of greater than 1 metre. The mean depth at which the calcareous C horizons begin in Niagara was 108 cm. The texture of all soil horizons was fine sand. Although the Plainfield soils in the Niagara Region are classified as Orthic Melanic Brunisols, the usual classification in more extensive areas of Plainfield soils, is Brunisolic Gray Brown Luvisol.

Soil Variability The few Plainfield soils that were examined in Niagara had deep profiles, without Bt horizons, as opposed to the majority in Haldimand-Norfolk, that had fairly well-developed Bt horizons. A few sand dunes in Wainfleet Township and along the Lake Erie shore were mapped as Plainfield dune phase (PFD.D) soils. Only one dune site was sampled in a woodland, and it had much

higher organic matter contents and lower pH values than normal Plainfield soils. Imperfectly drained Walsingham (WAM) soils, that also have fine sand textures, are sometimes found as inclusions, or associates, of Plainfield soils, where the terrain is level to gently hummocky.

Land Use/Management Comments Seasonal droughtiness is the major limitation of Plainfield soils. Low fertility and pH problems are also a concern. For these reasons capability for general field crops is only rated as Class 3F. Suitability for horticultural crops ranges from poor to fair, to fair to good, if irrigation is used. Sprinklers or trickle irrigation is a necessity for most high value horticultural crops.

Port Colborne Soils (PCE)

Soil Moisture Characteristics Port Colborne soils are very poorly drained. They are rapidly permeable but saturated by groundwater most of the time. They have high water-holding capacities and very slow runoff.

General Soil Characteristics Port Colborne soils are organic soils, in which the organic layers extend to a depth greater than 160 cm. In the Niagara Region, Port Colborne soils consist of fibric and mesic organic materials to a mean depth of approximately 225 cm. The mean organic matter content of the organic layers ranges from 45 to 91 percent and the pH varies from 3.4 to 5.0. The underlying B horizon usually extends below the lower inspection depth, and therefore, no C horizon was described. Soil classification is usually Fibric Mesisol.

Soil Variability The nature of the organic materials ranges from woody fen peat, to sedge fen peat or woody sedge fen peat. The texture of the underlying mineral soil is silty clay loam. The areal extent of Port Colborne soils is limited. It occurs in the Wainfleet Bog where it is mapped in association with the Wainfleet (WAF) soil.

Land Use/Management Comments Most Port Colborne soils are associated with forested wetlands and fens. Extensive clearing and drainage would be necessary before these soils could be used for agriculture. In addition, it would be helpful to have a method of controlling the subsurface water level, following drainage, in order to prevent the erosion by wind of the surface organic horizon. Drained Port Colborne soils are rated as Class 2FKL for common field crops according to the capability classification for organic soils. They are unsuitable for fruit crops. Vegetable crops, such as broccoli, onions, potatoes and celery are rated fair to good on drained Port Colborne soils.

Portsmouth Soils (PUH)

Soil Moisture Characteristics Portsmouth soils are very poorly drained. They are rapidly permeable, but saturated by groundwater most of the time. They have high water-holding capacities and very slow runoff.

General Soil Characteristics Portsmouth soils are organic soils, in which the organic layers extend to a depth greater than 160 cm. In the Niagara Region, Portsmouth soils consist primarily of mesic material to a mean depth of approximately 220 cm. The mean organic matter content of the organic layers ranges from 62 to 82 percent, and the pH varies from 4.7 to 5.4. The underlying mineral B horizon usually extends below the lower inspection depth, and therefore, no C horizon was described. Soil classification is usually Typic Mesisol.

Soil Variability The nature of the organic materials ranges from woody forest peat to woody sedge fen peat, with occasional horizons of sedge fen peat. The textures of the underlying mineral soil usually varies from silty clay and clay to heavy clay. The areal extent of Portsmouth soils is limited. They are mapped as single component map units east of Port Colborne along Lake Erie and in association with Quarry soils (QRY), on the Niagara Falls map sheet.

Land Use/Management Comments Most Portsmouth soils are associated with forested wetlands and swamps. Extensive clearing and drainage would be necessary before these soils could be used for agriculture. In addition, it would be helpful to have a method of controlling the subsurface water level, following drainage, in order to prevent the erosion by wind of the surface organic horizon. Drained Portsmouth soils are rated as Class 2FL-3F for common field crops according to the capability classification for organic soils. They are unsuitable for fruit crops. Vegetable crops, such as broccoli, onions, potatoes and celery are rated fair to good on drained Portsmouth soils.

Quarry Soils (QRY)

Soil Moisture Characteristics Quarry soils are very poorly drained. They are rapidly permeable, but saturated by groundwater most of the time. They have high water-holding capacities and very slow surface runoff.

General Soil Characteristics Quarry soils are organic soils, in which the organic layers extend to depths of 40 to 160 cm over clayey mineral soil material. In the Niagara Region, Quarry soils consist of mesic materials to a mean depth of 85 cm. The mean organic matter content of the organic layers is relatively uniform with depth, ranging from 69 to 74 percent. The pH is also fairly constant with depth, varying from 5.3 to 5.6. The underlying mineral B horizon extends to a mean depth of 112 cm, where the calcareous C horizon begins.

Soil Variability The nature of the organic materials is dominantly woody forest peat, with occasional layers of sedge fen peat. The texture of the underlying mineral soil usually varies from silty clay loam to silty clay. The areal extent of Quarry soils is limited. They are mapped immediately east of Port Colborne along Lake Erie. They also occur with Toledo peaty phase (TLD.P) soils, and Lorraine (LRR) soils, around the perimeter of the Wainfleet Bog. On the Niagara Falls map sheet, Quarry soils are associated with Portsmouth (PUH) soils, and Welland peaty phase (WLL.P) soils, occurring in low lying areas adjacent to some of the smaller creeks.

Land Use/Management Comments Most Quarry soils are associated with forested wetlands and swamps, except in the area east of Port Colborne, where onions are being grown. Extensive clearing and drainage is necessary before Quarry soils could be used for agriculture. In addition, it would be helpful to have a method of controlling the subsurface water level, following drainage, in order to prevent the erosion by wind of the surface organic horizon. Drained Quarry soils are rated as Class 2HL-3H for common field crops according to the capability classification for organic soils. They are unsuitable for fruit crops. Vegetable crops, such as broccoli, onions, potatoes and celery are rated fair to good on drained Quarry soils.

Ridgeville Soils (RVE)

Soil Moisture Characteristics Ridgeville soils are imperfectly drained. They are rapidly permeable and generally have low water-holding capacities. Surface runoff is relatively slow, increasing slightly as slopes increase.

General Soil Characteristics The surface Ap horizons of Ridgeville soils usually range between 20 and 25 cm in thickness, with an average of about 3 percent organic matter. The range in depth of underlying B horizons is from 60 to 85 cm below the surface. The most common textures are coarse sandy loam and gravelly loamy coarse sand. Surface horizons often have finer-textured fine sandy loam textures. Reddish hues prevail in Ridgeville soils, and distinct yellowish-brown to strong brown mottles commonly occur in the B and C horizons. The usual soil classification is Gleyed Melanic Brunisol.

Soil Variability Limited analyses of A and B horizons of Ridgeville soils indicate a range of pH values between 5.9 and 6.9. Ridgeville soils are sometimes found as inclusions in Fonthill (FNT) soils on level and depressional terrain. Fonthill soils have textures and hues similar to Ridgeville soils but are rapidly drained.

Land Use/Management Comments Because of a fertility limitation, Ridgeville soils are rated as Class 2F soils for common field crops. However, because of their location in the fruit growing area of the Fonthill Kame, they are presently being used almost exclusively for fruit crops. With drainage and irrigation they have good suitability for the hardier tree fruit crops. Climate can be somewhat limiting for tender fruit crops on the Fonthill Kame, as opposed to the area below the Niagara Escarpment.

Sherkston Soils (SRK)

Soil Moisture Characteristics Sherkston soils are very poorly drained. They are rapidly permeable, but saturated by groundwater most of the time. They have high water-holding capacities and very slow surface runoff.

General Soil Characteristics Sherkston soils are organic soils in which the organic layers extend to a depth greater than 160 cm. In the Niagara Region, Sherkston soils consist of mesic and fibric material to a mean depth of approximately 380 cm. The mean organic matter content of the organic layers ranges from 36 to 92 percent and the pH varies from 5.4 to 5.8. The underlying mineral B horizon extends to a mean depth of 384 cm where the calcareous C horizon begins. Soil classification is usually Typic Fibrisol.

Soil Variability The nature of the organic material is primarily sedge fen peat. The texture of the underlying mineral soil is usually silty clay. The areal extent of Sherkston soils is limited. They are mapped only between Port Colborne and Fort Erie near Lake Erie.

Land Use/Management Comments Most Sherkston soils are associated with forested wetlands and fens. Extensive clearing and drainage would be necessary before these soils could be used for agriculture. In addition, it would be helpful to have a method of controlling the subsurface water level, following drainage, in order to prevent the erosion by wind of the surface organic horizon. Drained Sherkston soils are rated as Class 4K for common field crops according to the capability classification for organic soils. They are unsuitable for fruit crops. Vegetable crops, such as broccoli, onions, potatoes and celery are rated fair to good, on drained Sherkston soils.

Silver Hill Soils (SIH)

Soil Moisture Characteristics Silver Hill soils are poorly drained. They are moderately to rapidly permeable in the upper sandy materials, but slowly permeable in the lower silty sediments. There is often a weak hardpan at the sand-silt contact zone that holds up the groundwater and saturates the soil until late spring or summer. Silver Hill soils have relatively high water-holding capacities and slow surface runoff.

General Soil Characteristics The surficial A and B horizons, that have developed in the upper sandy sediments, extend to a depth of 40 to 100 cm below the surface. They usually consist of fine sandy loam or very fine sandy loam textures. The underlying loamy sediments are composed of loam, silt loam or very fine sandy loam textures. A zone of prominent strong brown or yellowish-brown mottles occurs in the lower part of the sands, above the weakly-cemented contact zone, and in the underlying loamy sediments. Calcareous C horizons usually begin at a depth of 70 to 90 cm. Soil classification is usually Orthic Luvic Gleysol.

Soil Variability The thickness of overlying sandy sediments varies considerably between 40 to 100 cm. Textural anomalies, such as sandy or clayey layers, sometimes occur in the underlying silty sediments. Silver Hill soils may merge into similar, but imperfectly drained Vittoria (VIT) soils. Inclusions of poorly drained Granby (GNY) soils occur when sand depths exceed 100 cm.

Land Use/Management Comments Silver Hill soils require artificial drainage before they are suitable for growing common field crops or horticultural crops. When drained, they are rated Class 2W for field crops. Under similar conditions, they have fair suitability for grapes, hardy tree fruits, strawberries and most vegetable crops.

Smithville Soils (SHV)

Soil Moisture Characteristics Smithville soils are moderately well-drained. They are usually slowly permeable, but during dry periods, when cracks develop in the surface horizons, they can be moderately permeable. Temporary groundwater can occupy the upper horizons for short periods each year. Smithville soils have medium to high water-holding capacities, but are often droughty during dry periods because of slow water release by the clays. Surface runoff is usually rapid, increasing with slope.

General Soil Characteristics Smithville soils have relatively shallow profiles. The mean thickness of surface Ap horizons, in Niagara, is only 14 cm, and mean depth to the calcareous C horizons is 33 cm. The surface texture is usually silty clay, but heavy clay is the dominant texture of the subsoil B and C horizons. Soil structure usually varies from angular blocky to columnar, but massive structure can result in the upper horizons from inappropriate heavy machinery use. Smithville soils, like their imperfectly drained counterparts, the Haldimand soils, have pH values mainly in the neutral range of 5.5 to 7.4, but there is a small minority of sites with acid pH values less than 5.5 in the A and B horizons. The usual classification is Brunisolic Gray Brown Luvisol.

Soil Variability Smithville loamy phase (SHV.L) soils, with 15 to 40 cm of loamy sediments over clayey subsoils, are mapped in a few areas. Inclusions of Haldimand (HIM) soils are fairly common in areas where Smithville soils are

mapped. Poorly drained Lincoln (LIC) soils may also occur in depressions and channels of some Smithville soil areas.

Land Use/Management Comments Smithville soils are rated as Class 3D soils for common field crops because of structure limitations related to their heavy clay contents. As slopes increase, they also acquire topography limitations. Their suitability for soybeans and white beans is considered fair to good, and poor to fair for canola. They are unsuitable for tender fruit crops, and range from poor to fair suitability for grapes, small fruit and hardy tree fruit crops. They have poor to fair suitability for some vegetable crops, namely, cole crops, cucumbers, tomatoes, sweet corn and lettuce.

Tavistock Soils (TVK)

Soil Moisture Characteristics Tavistock soils are imperfectly drained, and moderately to slowly permeable. Temporary groundwater occupies the upper loamy sediments, just above the clay subsoil, for significant periods of time each year. Tavistock soils have relatively high water-holding capacities. Surface runoff ranges from moderate to high, depending on slope.

General Soil Characteristics The surface horizons of Tavistock soils usually range between 20 and 25 cm thick and have a mean organic matter content of 3.7 percent. Some of the B horizons have developed in the upper 40 to 100 cm of loamy sediments; IIBt and calcareous IICk horizons have developed in the underlying clayey sediments. The loamy sediments can have loam, silt loam or very fine sandy loam textures. Silty clay, silty clay loam or clay loam are the textures of the underlying clays. Distinct to prominent yellowish-brown to strong brown mottles occur in the B and C horizons. A weak, compacted hardpan sometimes occurs at the contact of the loamy and clayey sediments. The usual classification is Gleyed Brunisolic Gray Brown Luvisol.

Soil Variability Several Tavistock soil phases have been mapped in the Niagara Region. Tavistock red phase (TVK.R) soils have 40 to 100 cm of reddish-hued loamy sediments overlying the normal clayey subsoil. Tavistock heavy red phase (TVK.HR) soils have a similar cap of 40 to 100 cm of reddish-hued loams, but overlying heavy clay, rather than silty clay or silty clay loam sediments. Tavistock till phase (TVK.T) soils have 40 to 100 cm of loamy sediments over loam till. Tavistock till red phase (TVK.TR) soils are similar, except for 40 to 100 cm of reddish-hued loamy sediments. Tavistock soils are associated with many other soils in the field, most notably Bennington (BNG) and Maplewood (MPW) soils, that have similar textures, but are well-drained and poorly drained, respectively. Other Tavistock associates and inclusions are Toledo, including the loamy and loamy red phases (TLD, TLD.L, TLD.LR), Vineland and Vineland brown phase (VLD, VLD.B), Beverly loamy phase (BVY.L), Brant red phase (BRT.R), Jeddo (JDD) and Grimsby (GMY) soils.

Land Use/Management Comments Tavistock soils are suitable for a wide range of field and horticultural crops. For common field crops they are rated as Class 1. On steeper slopes these soils are given a capability Class 2E designation because of the high erodibility of the surface loamy materials. For most fruit crops the suitability ratings range from poor to fair to fair to good. Vegetable crops seem to be slightly better-suited to Tavistock soils as most are rated from fair to good, to fair. Some artificial drainage will be required for all horticultural crops. Irrigation may also be required for crops such as peaches, strawberries, green onions and potatoes. Tavistock soils are highly susceptible to degradation from erosion and compaction, so appropriate management techniques must be employed to minimize degradation.

Toledo Soils (TLD)

Soil Moisture Characteristics Toledo soils are poorly drained and usually only slowly permeable. Groundwater levels stay near the surface much of the year, subsiding somewhat during the growing season. Toledo soils have relatively high water-holding capacities and moderate to high surface runoff.

General Soil Characteristics The surface Ap horizons of Toledo soils usually average between 15 and 20 cm in thickness with mean organic matter contents of about 5 percent. Underlying Bg horizons usually extend to depths ranging between 40 and 60 cm, where they contact the calcareous C horizons. Surface horizons usually have silty clay loam textures; subsoil horizons are usually silty clay. Structures range from subangular blocky to columnar. Prominent yellowish-brown mottles occur throughout the B and C horizons. Toledo soils are usually classified as Orthic Humic Gleysols.

Soil Variability A number of phases of Toledo soils have been mapped in the Niagara Region. Toledo coarse phase (TLD.C) soils have 15 to 40 cm of sandy sediments over clayey subsoil. Toledo loamy phase (TLD.L) soils have 15 to 40 cm of loamy sediments over clayey subsoil. Toledo peaty phase (TLD.P) soils are very poorly drained, and have 15 to 40 cm of peaty material over clayey subsoil. Toledo red phase (TLD.R) soils occupy a fairly extensive area, and consist of soils similar to normal Toledo soils, but with reddish hues. Toledo loamy red phase (TLD.LR) soils have 15 to 40 cm of loamy sediments over reddish-hued clays. Toledo soils are most commonly associated with similar, but imperfectly drained, Beverly (BVY, BVY.C, BVY.L) soils, and sometimes with moderately well-drained Brantford (BFO) soils. Poorly drained Tavistock (TVK) and Maplewood (MPW) soils are common inclusions and associates of Toledo soils.

Land Use/Management Comments Toledo soils require artificial drainage to be useful for agricultural production. When drained, they are rated Class 3W for common field crops except for Toledo peaty phase (TLD.P) soils which are Class 4W. They have poor to fair suitability ratings for grapes, small fruits, hardy tree fruits and most vegetable crops. Care must be taken to avoid using machinery on Toledo soils that are too wet, in order to minimize degradation from compaction.

Trafalgar Soils (TFG)

Soil Moisture Characteristics Trafalgar soils are imperfectly drained, and moderately to slowly permeable. Groundwater occupies the subsoil horizons, except during the drier summer and fall seasons. Water-holding capacity is fairly high. Surface runoff is usually high, except during dry periods, when the surface often develops a network of soil cracks.

General Soil Characteristics Trafalgar soils have relatively shallow surface horizons, usually ranging between 15 and 20 cm thick. Subsoil B horizons usually extend to depths ranging from 55 to 70 cm before they contact the weakly calcareous C horizons. Trafalgar soils are characterized by reddish hues, which become redder with depth as the

Queenston shale is approached. Distinct reddish-brown mottles usually occur in the B horizons. Soil textures are usually silty clay loam or silty clay, and occasionally silt loam. Structures range from subangular blocky to columnar. Surface soil cracks often occur with a columnar pattern that is related to underlying soil structure. The usual classification is Gleyed Brunisolic Gray Brown Luvisol.

Soil Variability Trafalgar shallow phase (TFG.S) soils are fairly common in all Trafalgar soil areas. In these soils, the Queenston shale bedrock occurs between 50 and 100 cm depth below the surface. Horizons immediately overlying the bedrock often appear more like soft, weathered bedrock than soil. There are also a few areas of Trafalgar soil, overlain by 15 to 40 cm of loamy sediments, that are mapped as Trafalgar loamy phase (TFG.L) soils. Morley (MOY) soils are often associated with Trafalgar soils and frequently occur as inclusions within Trafalgar soil areas. They are poorly drained, but otherwise similar, in all aspects, to Trafalgar soils.

Land Use/Management Comments Although Trafalgar soils are rated as Class 2 soils for common field crops, their location below the Niagara Escarpment, in the heart of the fruit-growing areas, means that their use is virtually restricted to fruit crops. Some tile drainage is required before maximum yields are attainable from any fruit crop. With drainage, Trafalgar soils have suitabilities ranging from fair to good for grapes, small fruits and hardy tree fruits, to poor for tender fruit crops. Trafalgar shallow phase soils are unsuitable for tender fruit crops, pears and plums, and very poor to poor for apples.

Tuscola Soils (TUC)

Soil Moisture Characteristics Tuscola soils are imperfectly drained. Surface horizons are usually moderately permeable, but subsoil horizons may be slowly permeable if they have compacted horizons resulting from machinery use. Tuscola soils have temporary high water tables that usually recede, or disappear, during the growing season. They have high water-holding capacities, and moderate to high surface runoff, depending on slope.

General Soil Characteristics Tuscola soils have a mean surface horizon thickness of about 20 cm, and an average organic matter content of about 3.5 percent. The depth of subsoil B horizons varies, but the average depth of contact with calcareous C horizons is about 60 cm. Tuscola soil textures are usually silt loam or loam, and occasionally very fine sandy loam. Distinct or prominent dark yellowish-brown mottles occur in the B and C horizons. The pH values of A and B horizons are usually in the neutral range of 6.0 to 6.5. The usual soil classification is Gleyed Brunisolic Gray Brown Luvisol.

Soil Variability Tuscola red phase (TUC.R) soils, which have reddish hues, but otherwise, have properties similar to normal Tuscola soils, are fairly common in the Pelham and Niagara Falls areas. Normal Tuscola soils are often associated with their well-drained and poorly drained counterparts, Brant (BRT), and Colwood (CWO) soils, respectively. They may also be associated with imperfectly drained Tavistock (TVK), or Beverly loamy phase (BVY.L) soils, or with poorly drained Toledo loamy phase (TLD.L) soils. Tuscola red phase (TUC.R) soils have been mapped with well-drained Brant red phase (BRT.R) soils, imperfectly drained Tavistock red phase (TVK.R) and Vineland (VLD) soils, and poorly drained Maplewood (MPW, MPW.R), Colwood red phase (CWO.R), and Toledo (TLD.L, TLD.LR) soils.

Land Use/Management Comments Tuscola soils are rated highly for most field and horticultural crops, although tile drainage may be necessary to improve some wet spots. They are Class 1 soils for general field crops, and their ratings, with drainage, are fair to good, or good, for all horticultural crops. During dry periods, some supplemental irrigation may be necessary for certain horticultural crops like peaches or potatoes. Care must be taken not to overcompact Tuscola soils, because of their high susceptibility to compaction. They are also highly erodible, and must be managed carefully on slopes.

Vineland Soils (VLD)

Soil Moisture Characteristics Vineland soils are imperfectly drained and moderately to rapidly permeable. Groundwater levels may be near the surface during the early part of the growing season. During the growing season, after intense rains, temporary groundwater sometimes perches on hardpans that may form in the dry soil. Vineland soils have moderately low water-holding capacities, so they can be droughty during dry periods. Surface runoff is slow to moderate, increasing with slope.

General Soil Characteristics The surface Ap horizons of Vineland soils usually range between 20 and 25 cm in thickness, and have a mean organic matter content of 2.7 percent. B horizons are deep; calcareous C horizons usually start at the 75 to 85 cm depth below the surface. The most common texture is very fine sandy loam, but fine sandy loam, loamy fine sand, loam and silt loam textures also occur. Most Vineland soils have reddish hues, and distinct, strong brown mottles in the subsoil. Subangular blocky structures usually prevail, but massive, weak hardpans sometimes form near the surface, during dry periods. The usual classification is Gleyed Brunisolic Gray Brown Luvisol.

Soil Variability In some areas below the Niagara Escarpment, Vineland soils have brownish, rather than reddish hues. These have been mapped as Vineland brown phase (VLD.B) soils. Many soils are associated with, or occur as inclusions within areas of Vineland soils. Commonly associated soils, that have similar properties except for drainage are, well-drained Grimsby (GMY, GMY.B) and poorly drained Flamborough (FMB, FMB.B) soils. Dissimilar soils, that are often associated with Vineland soils, are well-drained Bennington red phase (BNG.R) soils; imperfectly drained Vittoria red phase (VIT.R) and Tavistock (TVK, TVK.R, TVK.TR) soils; and poorly drained Maplewood (MPW, MPW.R, MPW.TR), Colwood (CWO.R), Toledo (TLD.L) and Jeddo (JDD.R) soils.

Land Use/Management Comments Although Vineland soils are highly rated for most agricultural crops, they are used almost exclusively for growing fruit crops in the Niagara Region. With tile drainage, and supplemental irrigation when needed, they have good suitability for peaches, apricots, sour cherries, vinifera grapes, apples, strawberries and raspberries. With drainage, they have suitabilities ranging from fair to good for sweet cherries, pears, plums, and all vegetable crops. Management concerns, other than drainage and irrigation, for Vineland soils, are fairly high inherent erodibility, and maintenance of adequate organic matter levels.

Vittoria Soils (VIT)

Soil Moisture Characteristics Vittoria soils are imperfectly drained. They are usually rapidly permeable through the surficial sandy sediments, but slowly permeable through the underlying loamy sediments, that may be capped by a weak hardpan. Groundwater often temporarily occupies the zone above the sand-loam contact. Vittoria soils have moderate to high water-holding capacities. Surface runoff is slow on level terrain, but increases on sloping areas.

General Soil Characteristics Vittoria soil surface horizons have an average thickness of about 25 cm, and an average organic matter content close to 3 percent. Subsoil B horizons may extend through the sands into the underlying loams, or they may stop at the loamy boundary where calcareous C horizons begin. Textures of the 40 to 100 cm of upper sandy sediments are usually very fine sandy loam, or fine sandy loam; lower loamy sediments have silt loam or loam textures. Distinct or prominent strong brown to yellowish-brown mottles occur in subsoil B and C horizons. Subangular blocky structures usually prevail, except at the sand-loam junction, where massive structures and a weak hardpan often occur. The usual classification is Gleyed Brunisolic Gray Brown Luvisol.

Soil Variability Vittoria red phase (VIT.R) soils occur on the Iroquois sand plain near Lake Ontario, and just south of the Fonthill Kame. They have reddish hues, but are otherwise similar to normal Vittoria soils. The most common associate or inclusion of Vittoria soils, below the Niagara Escarpment, are imperfectly drained, sandy Vineland (VLD, VLD.B) soils. In the Pelham area, Vittoria soils are often associated with similar, but well-drained, Walsher (WSH) soils.

Land Use/Management Comments Although Vittoria soils have Class 1 capability for common field crops, in the Niagara Region they are generally used for growing fruit crops. With tile drainage, their suitability ranges from fair to good for all fruit crops grown in the Niagara Region. They have similarly high suitabilities for all the commonly grown vegetable crops if drainage is improved. For some crops like peaches, apricots, strawberries and raspberries, some supplemental irrigation may be required during dry periods. The formation of compacted layers or hardpan, by heavy machinery use on soils that are too wet, is an increasing problem. Water erosion on slopes is also a management concern.

Wainfleet Soils (WAF)

Soil Moisture Characteristics Wainfleet soils are very poorly drained. They are rapidly permeable, but saturated by groundwater most of the time. They have high water-holding capacities and very slow surface runoff.

General Soil Characteristics Wainfleet soils are organic soils in which the organic layers extend to a depth greater than 160 cm. In the Niagara Region, Wainfleet soils consist of mesic and fibric material to a mean depth of approximately 160 cm. The mean organic matter content of the organic layers ranges from 76 to 90 percent and the pH varies from 3.5 to 5.4. The underlying mineral B horizon usually extends to a depth greater than the lower inspection depth, and therefore C horizons were not described. Soil classification is usually Mesic Fibrisol.

Soil Variability The nature of the organic material is primarily woody sedge fen peat. The texture of the underlying mineral soil is usually silty clay loam. The areal extent of Wainfleet soils is limited to the main portion of the Wainfleet Bog, where they are mapped in association with Port Colborne (PCE) soils.

Land Use/Management Comments Most Wainfleet soils are associated with forested wetlands. Extensive clearing and drainage would be necessary before these soils could be used for agriculture. In addition, it would be helpful to have a method of controlling the subsurface water level, following drainage, in order to prevent the erosion by wind of the surface organic horizon. Drained Wainfleet soils are rated as Class 3K for common field crops according to the capability classification for organic soils. They are unsuitable for fruit crops. Vegetable crops, such as broccoli, onions, potatoes and celery are rated fair to good, on drained Wainfleet soils.

Walsher Soils (WSH)

Soil Moisture Characteristics Walsher soils are well-drained, and usually rapidly permeable through the upper sandy materials. Permeability decreases through the underlying loamy subsoil, which is sometimes capped by a relatively impermeable, compacted layer. Walsher soils have relatively high water-holding capacities. Surface runoff ranges from slow, on level areas, to rapid on steeper slopes.

General Soil Characteristics Surface horizons of Walsher soils have variable thicknesses, ranging usually between 15 and 20 cm, and mean organic matter contents near 2 percent. The pH values can be quite variable, and are sometimes in the acid range, lower than 5.5, in the surface horizons. B horizons are deep, often extending deeper than 100 cm to the contact with calcareous C horizons. Textures of the surface 40 to 100 cm of sandy sediments, are usually very fine sandy loam or fine sandy loam. Underlying loamy sediments have loam or silt loam textures. A dense compacted layer is sometimes present at the sand-loam contact. The usual classification is Brunisolic Gray Brown Luvisol.

Soil Variability Walsher soils are mapped to a very limited extent in the Niagara Region. They occur on the Pelham map sheet in the vicinity of Fonthill. The most common inclusions, or associated soil, is the similar, but imperfectly drained Vittoria (VIT) soil.

Land Use/Management Comments Walsher soils are good agricultural soils, and useful for both common field crops and horticultural crops. They can have droughtiness limitations during dry periods, and many horticultural crops will require supplemental irrigation. Maintenance of both organic matter, and fertility levels, is another important management concern.

Walsingham Soils (WAM)

Soil Moisture Characteristics Walsingham soils are imperfectly drained, and rapidly permeable. The imperfect drainage is due to fluctuating water tables within the B and C horizons. Evidence of this is the presence of distinct or prominent yellowish-red or yellowish-brown mottles. Walsingham soils have low water-holding capacities. Surface runoff is slow on level areas, but increases with slope.

General Soil Characteristics The surface horizons of Walsingham soils usually average between 20 and 25 cm in thickness, and have a mean organic matter content of 1.6 percent. Subsoil B horizons usually extend to a depth of 75 to 100 cm below the surface. Calcareous C horizons underlie

the B horizons. Yellowish-brown mottles usually occur throughout both B and C horizons. Fine sand textures are most prevalent, but layers of loamy fine sand and very fine sandy loam sometimes occur. Walsingham soils are usually classified as Gleyed Brunisolic Gray Brown Luvisols.

Soil Variability Most of the Walsingham soils are mapped in the Wainfleet area, where they are associated with Plainfield dune phase (PFD.D) soils, on gently sloping hummocky terrain, and with Wauseon (WUS) soils on more level to depressional areas. The Plainfield (PFD) soils have textures similar to Walsingham soils, but are rapidly drained. Wauseon soils are poorly drained, and have sands overlying clay subsoils, at 40 to 100 cm below the surface.

Land Use/Management Comments Walsingham soils are Class 3F soils for common field crops because of their fertility requirements, and possible droughtiness limitations. In the Township of Wainfleet, where most Walsingham soils are used for vegetable crops, artificial drainage is required, and sometimes supplemental irrigation. Because of their location they are not likely to be used for growing fruit crops, but if they are, they would require tile drainage and supplemental irrigation for most crops.

Wauseon Soils (WUS)

Soil Moisture Characteristics Wauseon soils are poorly drained. The surface sands are rapidly permeable, but permeability is slow in the subsoil clays. The poor drainage of Wauseon soils is related to the presence of groundwater levels near the ground surface most of the year. The high groundwater levels are a result of impermeable clay at depths of 40 cm or greater. Wauseon soils have low water-holding capacities in the surface sands; water-holding capacities in the subsoil clays are high. Surface runoff is slow.

General Soil Characteristics Surface horizon depths and organic matter contents are quite variable. The pH values are also variable in the upper sandy horizons of the profiles, ranging from 6.2 to 6.9. Subsoil B horizons, in the sands, can range from 40 to 100 cm below the surface. A IIB horizon also occurs in the underlying clay subsoil. In the Niagara Region, the calcareous C horizons occur at a mean depth of about 70 cm in the clay subsoil. The surface sand textures are fine sandy loam, sometimes very fine sandy loam. Silty clay textures predominate in the underlying clays. A relatively impermeable hardpan often occurs, at the sand-clay boundary. Distinct or prominent, strong brown mottles occur in the sands; prominent, yellowish-brown mottles are present in the clays. Soil classification is usually Orthic Humic Gleysol.

Soil Variability In the field, Wauseon soils often merge with Berrien (BRR) soils, which are similar, but imperfectly drained. They are also commonly associated with poorly drained, Toledo coarse phase (TLD.C) soils, that have 15 to 40 cm of sandy sediments over clay subsoil.

Land Use/Management Comments If they are artificially drained Wauseon soils are Class 2W for common field crops because of the high water levels in the profile for a significant portion of the year. Wauseon soils, if drained, have fair suitability for all fruit and vegetable crops, but they are considered unsuitable for tender fruit crops. In addition to tile drainage, subsoiling might be considered, where hardpans occur.

Welland Soils (WLL)

Soil Moisture Characteristics Welland soils are poorly drained. They are slowly permeable, except during the summer, when surface cracking increases the permeability. Groundwater levels remain close to the surface most of the year, except during the summer. Moisture availability to plants is affected during dry periods by the high clay content, even though Welland soils have relatively high water-holding capacities. Surface runoff is slow to moderate.

General Soil Characteristics Welland surface horizons average only 16 cm in thickness, with organic matter contents close to 6 percent. The depth of B horizons ranges from 40 to 60 cm, at which depth the calcareous C horizons begin. A horizon textures are variable, but usually silty clay. Soil structure is usually angular blocky or columnar, becoming massive when compacted by heavy machinery. Surface cracking is common during dry summer periods. Welland soils have reddish hues, and prominent, strong brown mottles, in the B and C horizons. Although mean pH values of the A and B horizons are between 6.0 and 6.5, a significant minority of sites registered acid pH values less than 5.5. Soil classification is usually Orthic Humic Gleysol.

Soil Variability There are a few areas of Welland loamy phase (WLL.L) soils, which have 15 to 40 cm of loamy sediments over clayey subsoil. One relatively small area of Welland peaty phase (WLL.P) soil has been mapped near the Wainfleet Bog. It consists of 15 to 40 cm of organic soil over clayey subsoil, and is very poorly drained. The most common inclusion, and associate, of Welland soils, is the similar, but imperfectly drained Niagara soil. A few areas of dominantly Welland soils are associated with poorly drained Malton heavy red phase (MAT.HR), and very poorly drained Lincoln peaty phase (LIC.P) soils.

Land Use/Management Comments The combined problems of high water tables and high clay contents limit the use of Welland soils for most agricultural crops. For common field crops they are rated Class 3WD if they are artificially drained and Class 5W if they are not tile drained, except for the Welland peaty phase (WLL.P) soils, which are Class 4W and Class 5W respectively. Permeability is usually slow, and soils that are too wet can be compacted, so care must be taken with machinery use. Welland soils range from unsuitable to poorly suitable for most fruit and vegetable crops.

Miscellaneous Land Units

Complex 1 (CPX 1)

This is a beach-scarp complex that is mapped at various places along the Lake Erie and Lake Ontario shorelines. It is usually mapped only where wave-eroded cliffs or scarps occur in combination with beaches, and where such areas are extensive enough to warrant mapping.

The beach component of this complex is mainly composed of medium and coarse, calcareous sand, with some gravel pebbles, cobbles or flags. Outcrops of cherty limestone occur in some places along the Lake Erie shoreline, especially in the Long Beach vicinity. Beach width is rarely greater than 20 metres.

The wave-eroded cliffs or scarps, along the shorelines, have been formed by wave erosion that has been particularly severe in recent years. The height of these cliffs ranges from one or two metres up to 50 metres. Slopes are usually greater than 30 percent. Soil materials are variable. Queenston shale outcrops occur on many scarps bordering Lake Ontario.

Complex 7 (CPX 7)

Some ravines that extend from or through the Niagara Escarpment, towards Lake Ontario, have been mapped as Complex 7. They consist of steep-sided slopes that are continuations of the Niagara Escarpment, bordering valley floor floodplains. Bedrock usually outcrops on both the ravine slopes and floodplain floors.

Escarpment (ESC)

The Niagara Escarpment is mapped as a more or less continuous feature through the Niagara Peninsula, a few kilometres south of the Lake Ontario shoreline. Slopes are steep, usually greater than 30 percent. Bedrock outcrops are common on the slopes, but small pockets of shallow soil over bedrock also occur.

Marsh (MAR)

Marshes are characterized by water above the ground surface most of the year, and by thin, organic-rich surface deposits overlying variable sediments. The most characteristic plants of marsh areas are cattails. Most marsh areas have been mapped in drowned floodplains of stream valleys entering Lake Ontario, between Vineland and Niagara-on-the-Lake. A few marsh areas also occur on the Lyons Creek floodplain, south of Niagara Falls.

Not Mapped (NM)

Areas that were not mapped include the following: built-up areas of towns and cities; areas adjacent to built-up areas where construction was occurring and soil was being disturbed; four-lane highways and interchanges; airports; golf courses; gravel pits; quarries; and areas of intensive strip development along roads. The largest not mapped areas were the St. Catharines - Thorold complex, the City of Niagara Falls and its environs, and the Welland - Port Colborne corridor.

SOIL INTERPRETATIONS FOR AGRICULTURE

A. AGRICULTURAL CAPABILITY CLASSIFICATION FOR COMMON FIELD CROPS

(1) Capability Classification for Mineral Soils

The Canada Land Inventory classification system of land capability for agriculture is described in CLI Report No. 2 (14). It groups mineral soils into seven classes according to their potential and limitation for agricultural use for common field crops. Common field crops include corn, oats, wheat, barley and perennial forage crops such as alfalfa, grasses and birdsfoot trefoil. Crops such as soybeans, white beans, tobacco, fruits and vegetables are not covered by this classification.

The best soils, with no significant limitations for crop use, are designated Class 1. Soils designated Classes 2 to 6 have decreasing capability for agriculture, and Class 7 soils have no agricultural potential. A brief outline of each agricultural capability class follows.

Soil Capability Classes

Class 1 — Soils in this class have no significant limitations in use for crops. These soils are level to very gently sloping, deep, well- to imperfectly drained, and hold moisture and plant nutrients well. They can be managed and cropped without difficulty. Under good management they are moderately high to high in productivity for common field crops.

Class 2 — Soils in this class have moderate limitations that restrict the range of crops, or require moderate conservation practices. These soils are deep, and may not hold moisture and nutrients as well as Class 1 soils. The limitations are moderate, and the soils can be managed and cropped with little difficulty. Under good management, they are moderately high to high in productivity for common field crops.

Class 3 — Soils in this class have moderately severe limitations that restrict the range of crops, or require special conservation practices. The limitations are more severe than for Class 2 soils. They affect one or more of the following practices: timing and ease of tillage; planting and harvesting; choice of crops; and methods of conservation. Under good management, they are fair to moderately high in productivity for common field crops.

Class 4 — Soils in this class have severe limitations that restrict the range of crops or require special conservation practices, or both. The limitations seriously affect one or more of the following practices: timing and ease of tillage; planting and harvesting; choice of crops; and methods of conservation. The soils are low to fair in productivity for common field crops, but may have higher productivity for a specially adapted crop.

Class 5 — Soils in this class have very severe limitations that restrict their capability to produce perennial forage crops, and improvement practices are feasible The limitations are so severe that the soils are not capable of use for sustained production of annual field crops. The soils are capable of producing native or tame species of perennial forage plants, and may be improved by use of farm machinery. The improvement practices may include clearing of bush, cultivating, seeding, fertilizing or water control.

Class 6 — Soils in this class are only capable of producing perennial forage crops, and improvement practices are not feasible. These soils provide some sustained grazing for farm animals, but the limitations are so severe, that improvements by use of farm machinery are impractical. The terrain may be unsuitable for use of farm machinery, or the soils may not respond to improvement, or the grazing season may be very short.

Class 7 — Soils in this class have no capability for arable culture, or permanent pasture. This class includes marsh, rockland and soil on very steep slopes.

O - Organic Soils — Thes soils are not classified in this system which has been devised for mineral soils only. They are classified in a separate organic soil classification system.

Soil Capability Subclasses

Subclasses are divisions, within classes, that have the same kind of limitations for agricultural use as a result of soil and climate. Thirteen different kinds of limitations have been recognized, at the subclass level, and are described in CLI Report No. 2 (14). Only those subclasses used to classify the soils of Niagara are listed below. Guidelines for determining most subclasses were obtained from (14). Assistance in determining subclasses W, M, D and R were obtained from a computer program developed by R.A. McBride (15). Guidelines for determining subclass E were determined after consultation with G.J. Wall, Agriculture Canada (personal communication).

Subclass D —Undesirable soil structure and/or permeability.

Subclass E — Erosion damage, or potential damage from erosion, limits agricultural use of the land.

Subclass F — Low natural fertility, which may or may not be possible to correct by additions of fertilizers or manure.

Subclass I — Inundation by flooding of streams or lakes limits agricultural use.

Subclass M —Moisture limitations due to low moisture-holding capacities, cause droughtiness that limits agricultural use.

Subclass P — Stoniness. Stones interfere with tillage, planting and harvesting.

Subclass R — Shallowness to bedrock, which is less than one metre from the soil surface.

Subclass S — Adverse soil characteristics. Used when two or more of the limitations represented by Subclasses D, F or M are present, or when two of the limitations represented by Subclasses D, F or M are present and some additional limitation occurs, e.g. T.

Subclass T — Adverse topography due to steepness, or complexity of slopes, limits agricultural use, by increasing the cost of farming over that on level land, by decreasing the uniformity of growth and maturity of crops, and by increasing the hazard of erosion damage by water.

Subclass W —Excess water, other than from flooding, limits use for agriculture. The excess water may be due to poor drainage, a high water table, seepage, or runoff from surrounding areas.

Assumptions

Before using the soil capability tables, it is important that the user have an understanding of the following assumptions, upon which the classification is based:

(a) The soils will be well-managed and cropped under a largely mechanized system.

(b) Land requiring improvements, e.g. drainage, that can be done economically by the farmer himself, is classed according to its limitations or hazards, in use, after the improvements have been made.

(c) The following are not considered: distances to market, kind of roads, location or size of farms, type of ownership, cultural patterns, skills or resources of individual operators, and hazard of crop damage by storm.

(d) The classification includes capabilities of soils for common field crops such as forage crops, small grains and corn. It does not include capabilities for other special crops, such as soybeans or tobacco, or for horticultural crops.

(e) Capability classes are subject to change, as new information on the properties, behaviour and responses of soils becomes available. In some cases, technological advances may also necessitate changes.

(2) Capability Classification for Organic Soils

The previous discussion on soil capability classification applies only to mineral soils, and cannot be used for organic soils. A separate capability system has been devised for organic soils, using seven capability classes that are determined according to the following soil characteristics: stage of decomposition (K), reaction (F), climate (C), substratum texture, wood content (L) and depth of organic soil (H). Definitions of these soil characteristics and how they are used to determine organic soil capability classes, are discussed by Hoffman and Acton (16). In this classification system, intensive horticultural use is assumed, e.g. vegetable production.

Capability Classes

Class 1 — Organic soils of this class have no water, topographical or pH limitations, and are deep and level.

Class 2 — Organic soils in Class 2 have one limitation that restricts their use in a minor way. The limitation may be woodiness, reaction, flooding, topography, depth or climate.

Class 3 — Organic soils in this class have moderately severe limitations that restrict the range of crops, or that require special management practices.

Class 4 — Soils in this class have limitations that severely restrict the range of crops, or require special development and management practices. Reclamation and management costs will be high.

Class 5 — Soils of this class have such severe limitations that they are restricted to the production of perennial forage or other specially adapted crops. Large scale reclamation is not feasible.

Class 6 — Class 6 organic soils are capable of producing only indigenous crops, and improvement practices are not feasible.

Class 7 — Organic soils of this class have no capability for agriculture.

Development of organic soils for agricultural use also depends on the feasibility of clearing vegetation, drainage and water level control (16). These are site-specific factors that are not considered for the general organic soil capabilities.

(3) How to Determine Capability Ratings from the Soil Map

1. Take any map unit designation from a final Niagara Region soil map.

e.g. $\frac{\text{BFO 6}}{\text{d > B}}$

Brantford (BFO) and Beverly (BVY) soils are the components of this map unit, as indicated by the legend on the soil map. This map unit contains approximately 70 percent of BFO soils and 30 percent of BVY soils.

2. To determine capability ratings from the tables, first find the soil component name (in alphabetical order on the left hand side of the tables in the column entitled "Soil map unit component"). The symbol for that soil component is shown on the same line in the next column.

e.g.	**Soil map unit component**	**Map symbol**
	Brantford	BFO
	Beverly	BVY

3. Next move horizontally to the column entitled "Capability classification by slope classes". Each soil map unit component is associated with a slope class shown in the denominator of each map unit designation.

e.g. $\frac{\text{BFO 6}}{\text{d > B}}$

In this example, d slopes (5 - 9 percent) are associated with the dominant (approximately 70 percent) BFO map unit component, while B slopes (0 - 2 percent) are associated with the other (approximately 30 percent) BVY map unit component.

4. After determining the appropriate slope group, move horizontally in the table to determine the capability rating. The soil capability rating for Brantford soils on d slopes is 3T and for Beverly soils on B slopes is 2D. The capability rating of the soil map unit is therefore 70 percent Class 3T and 30 percent Class 2D.

5. In the case of poorly drained soils, such as the Colwood, the rating which appears in brackets is the capability class which would be assigned to that soil if tile drainage was not in place, or was not feasible.

Table 5. Agricultural land capability for common field crops in the Regional Municipality of Niagara

Soil map unit component	Map symbol	Capability classification by slope classes								
		B	C	c	D	d	E	e	F,f	G,g
Alluvium 1	1-ALU	5I	5I	5I						
Alluvium 1 very shallow phase	1-ALU.V	6R	6R	6R	6R	6R				
Alluvium 2	2-ALU	3I	3I	3I						
Alluvium 3	3-ALU	3I	3I	3I						
Alluvium 4	4-ALU	3I	3I	3I						
Bennington	BNG	2M	2ME	2MT	3T	3T	4T	4T	5T	6T
Bennington red phase	BNG.R	2M	2ME	2MT	3T	3T	4T	4T	5T	6T
Berrien	BRR	1	1	2T	2T	3T				
Berrien red phase	BRR.R	1	1	2T	2T	3T				
Berrien till phase	BRR.T	1	1	2T	2T	3T				
Beverly	BVY	2D	2DE	2DT	3T	3T				
Beverly coarse phase	BVY.C	2D	2DE	2DT	3T	3T				
Beverly loamy phase	BVY.L	2D	2DE	2DT	3T	3T				
Beverly loamy red phase	BVY.LR	2D	2DE	2DT	3T	3T				
Beverly red phase	BVY.R	2D	2DE	2DT	3T	3T				
Bookton	BOO	2M	2M	2MT	2MT	3T	3T	4T	5T	6T
Bookton red phase	BOO.R	2M	2M	2MT	2MT	3T	3T	4T	5T	6T
Brady	BAY	2F	2F	2FT	2FT	3T				
Brady red phase	BAY.R	2F	2F	2FT	2FT	3T				
Brant	BRT	1	2E	2T	3T	3T	4T	4T	5T	6T
Brant red phase	BRT.R	1	2E	2T	3T	3T	4T	4T	5T	6T
Brantford	BFO	2D	2DE	2DT	3T	3T	4T	4T	5T	6T
Brantford loamy phase	BFO.L	2D	2DE	2DT	3T	3T	4T	4T	5T	6T
Brantford loamy red phase	BFO.LR	2D	2DE	2DT	3T	3T	4T	4T	5T	6T
Brantford red phase	BFO.R	2D	2DE	2DT	3T	3T	4T	4T	5T	6T
Brooke shallow phase	BOK.S	4W	4W	4W						
Brooke very shallow phase	BOK.V	5W	5W	5W						
Cashel	CSH	2D	2DE	2DT	3T	3T	4T	4T	5T	6T
Cashel heavy red phase	CSH.HR	3D	3D	3DT	3DT	3DT	4T	4T	5T	6T
Cashel red phase	CSH.R	2D	2DE	2DT	3T	3T	4T	4T	5T	6T
Cashel washed phase	CSH.W	1	2DE	2DT	3T	3T	4T	4T	5T	6T
Chinguacousy	CGU	2D	2DE	2DT	3T	3T				
Chinguacousy coarse phase	CGU.C	2D	2DE	2DT	3T	3T				
Chinguacousy loamy phase	CGU.L	2D	2DE	2DT	3T	3T				
Chinguacousy loamy red phase	CGU.LR	2D	2DE	2DT	3T	3T				
Chinguacousy red phase	CGU.R	2D	2DE	2DT	3T	3T				
Chinguacousy red washed phase	CGU.RW	1	2DE	2DT	3T	3T				
Chinguacousy washed phase	CGU.W	1	2DE	2DT	3T	3T				
Colwood	CWO	2W	2WE	2WT	(4W)*					
Colwood red phase	CWO.R	2W	2WE	2WT	(4W)*					
Complex 1	CPX 1	NOT RATED								
Complex 7	CPX 7	NOT RATED								
Escarpment	ESC								7R	7R
Farmington	FRM	6R	6R	6R	6R	6R	6R	6R	6R	6RT
Farmington shallow phase	FRM.S	3R	3R	3R	3RT	3RT	4T	4T	5T	6T
Farmington very shallow phase	FRM.V	4R	4R	4R	4R	4R	4RT	4RT	5T	6T
Flamborough	FMB	2W	2WE	2WT	(4W)*					
Flamborough brown phase	FMB.B	2W	2WE	2WT	(4W)*					
Fonthill	FNT	2FM	2FM	2ST	2ST	3T	3T	4T	5T	6T
Fox	FOX	2FM	2FM	2ST	2ST	3T	3T	4T	5T	6T
Fox red phase	FOX.R	2FM	2FM	2ST	2ST	3T	3T	4T	5T	6T
Franktown shallow phase	FKW.S	3R	3R	3R	3RT	3RT				
Franktown very shallow phase	FKW.V	4R	4R	4R	4R	4R				
Granby	GNY	2W	2W	2WT	(4W)*					
Granby peaty red phase	GNY.PR	4W	4W	4W	(5W)*					
Grimsby	GMY	2M	2E	2T	3T	3T	4T	4T	5T	6T

**Appropriate capability ratings of poorly drained soils without drainage improvements. These ratings apply to all slope classes.*

***Organic soil ratings are for intensive horticultural use such as vegetable production and apply to all slope classes.*

Table 5. Agricultural land capability for common field crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Capability classification by slope classes								
		B	C	c	D	d	E	e	F,f	G,g
Grimsby brown phase	GMY.B	2M	2E	2T	3T	3T	4T	4T	5T	6T
Haldimand	HIM	3D	3D	3DT	3DT	3DT				
Haldimand coarse phase	HIM.C	3D	3D	3DT	3DT	3DT				
Haldimand loamy phase	HIM.L	3D	3D	3DT	3DT	3DT				
Holly	HOY	3H-4H**								
Jeddo	JDD	3W	3W	3W		(4-5W)*				
Jeddo loamy phase	JDD.L	3W	3W	3W		(5W)*				
Jeddo loamy red phase	JDD.LR	3W	3W	3W		(5W)*				
Jeddo red phase	JDD.R	3W	3W	3W		(4-5W)*				
Jeddo red washed phase	JDD.RW	3W	3W	3W		(4W)*				
Jeddo washed phase	JDD.W	3W	3W	3W		(4W)*				
Lincoln	LIC	3WD	3WD	3WD		(5W)*				
Lincoln coarse phase	LIC.C	3WD	3WD	3WD		(5W)*				
Lincoln loamy phase	LIC.L	3WD	3WD	3WD		(5W)*				
Lincoln peaty phase	LIC.P	4W	4W	4W		(5W)*				
Lorraine	LRR	2FHL-3FH**								
Malton	MAT	3W	3W	3W		(5W)*				
Malton heavy phase	MAT.H	3WD	3WD	3WD		(5W)*				
Malton heavy red phase	MAT.HR	3WD	3WD	3WD		(5W)*				
Malton loamy red phase	MAT.LR	3W	3W	3W		(5W)*				
Malton red phase	MAT.R	3W	3W	3W		(5W)*				
Maplewood	MPW	2W	2WE	2WT		(4W)*				
Maplewood red phase	MPW.R	2W	2WE	2WT		(4W)*				
Maplewood till phase	MPW.T	2W	2WE	2WT		(4W)*				
Maplewood till red phase	MPW.TR	2W	2WE	2WT		(4W)*				
Marsh	MAR	7I								
Morley	MOY	3W	3W	3W		(5W)*				
Morley shallow phase	MOY.S	3W	3W	3W		(5W)*				
Niagara	NGR	3D	3D	3DT	3DT	3DT				
Niagara loamy phase	NGR.L	3D	3D	3DT	3DT	3DT				
Not Mapped	NM	NOT RATED								
Oneida	OID	2D	2DE	2DT	3T	3T	4T	4T	5T	6T
Oneida loamy phase	OID.L	2D	2DE	2DT	3T	3T	4T	4T	5T	6T
Oneida loamy red phase	OID.LR	2D	2DE	2DT	3T	3T	4T	4T	5T	6T
Oneida red phase	OID.R	2D	2DE	2DT	3T	3T	4T	4T	5T	6T
Oneida red washed phase	OID.RW	1	2DE	2DT	3T	3T	4T	4T	5T	6T
Oneida washed phase	OID.W	1	2DE	2DT	3T	3T	4T	4T	5T	6T
Ontario	OT1	3D	3D	3DT	3DT	3DT	4T	4T	5T	6T
Peel	PEL	2D	2DE	2DT	3T	3T				
Peel coarse phase	PEL.C	2D	2DE	2DT	3T	3T				
Peel heavy phase	PEL.H	3D	3D	3DT	3DT	3DT				
Peel heavy red phase	PEL.HR	3D	3D	3DT	3DT	3DT				
Peel loamy phase	PEL.L	2D	2DE	2DT	3T	3T				
Peel loamy red phase	PEL.LR	2D	2DE	2DT	3T	3T				
Peel red phase	PEL.R	2D	2DE	2DT	3T	3T				
Plainfield	PFD	3F	3F	3F						
Plainfield dune phase	PFD.D				3F	3FT	3FT	4T	5T	6T
Port Colborne	PCE	2FKL**								
Portsmouth	PUH	2FL-3F**								
Quarry	QRY	2HL-3H**								
Ridgeville	RVE	2F	2F	2FT	2FT	3T				
Sherkston	SRK	4K**								
Silver Hill	SIH	2W	2W	2WT		(4W)*				
Smithville	SHV	3D	3D	3DT	3DT	3DT	4T	4T	5T	6T
Smithville loamy phase	SHV.L	3D	3D	3DT	3DT	3DT	4T	4T	5T	6T
Tavistock	TVK	1	2E	2T	3T	3T				

**Appropriate capability ratings of poorly drained soils without drainage improvements. These ratings apply to all slope classes.*

***Organic soil ratings are for intensive horticultural use such as vegetable production ana apply to all slope classes.*

Table 5. Agricultural land capability for common field crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Capability classification by slope classes								
		B	C	c	D	d	E	e	F,f	G,g
Tavistock heavy red phase	TVK.HR	1	2E	2T	3T	3T				
Tavistock red phase	TVK.R	1	2E	2T	3T	3T				
Tavistock till phase	TVK.T	1	2E	2T	3T	3T				
Tavistock till red phase	TVK.TR	1	2E	2T	3T	3T				
Toledo	TLD	3W	3W	3W		(5W)*				
Toledo coarse phase	TLD.C	3W	3W	3W		(5W)*				
Toledo loamy phase	TLD.L	3W	3W	3W		(5W)*				
Toledo loamy red phase	TLD.LR	3W	3W	3W		(5W)*				
Toledo peaty phase	TLD.P	4W	4W	4W		(5W)*				
Toledo red phase	TLD.R	3W	3W	3W		(5W)*				
Trafalgar	TFG	2D	2DE	2DT						
Trafalgar loamy phase	TFG.L	2D	2DE	2DT						
Trafalgar shallow phase	TFG.S	2D	2DE	2DT						
Tuscola	TUC	1	2E	2T	3T	3T				
Tuscola red phase	TUC.R	1	2E	2T	3T	3T				
Vineland	VLD	1	2E	2T	3T	3T				
Vineland brown phase	VLD.B	1	2E	2T	3T	3T				
Vittoria	VIT	1	1	2T	2T	3T				
Vittoria red phase	VIT.R	1	1	2T	2T	3T				
Wainfleet	WAF	3K**								
Walsher	WSH	2M	2M	2MT	2MT	3T	3T	4T	5T	6T
Walsingham	WAM	3F	3F	3F	3F	3FT				
Wauseon	WUS	2W	2W	2WT		(4W)*				
Welland	WLL	3WD	3WD	3WD		(5W)*				
Welland loamy phase	WLL.L	3WD	3WD	3WD		(5W)*				
Welland peaty phase	WLL.P	4W	4W	4W		(5W)*				

**Appropriate capability ratings of poorly drained soils without drainage improvements. These ratings apply to all slope classes.*

***Organic soil ratings are for intensive horticultural use such as vegetable production and apply to all slope classes.*

B. AGRICULTURAL SUITABILITY CLASSIFICATION FOR SPECIAL CROPS

The CLI classification system of land capability for agriculture is designed for common field crops, such as forages, small grains and corn, but not for other less commonly grown field and horticultural crops, henceforth referred to as "special crops".

Since a large portion of the Niagara Region, particularly the area below and just above the Niagara Escarpment, is used for growing special crops, a suitability rating system was devised for the soils of the Region, and for a number of the most important special crops. The ratings are based on information obtained from field observations, agricultural research and extension personnel, and from research of relevant literature. The publication, Climate and Soil Requirements for Economically Important Crops in Canada (17) was especially helpful.

Tables 6, 7, and 8 indicate the suitability ratings of a number of special crops, for the soil map unit components of the Region. Suitability ratings for the following special field crops are shown in Table 6: soybeans, white beans, spring canola and winter rapeseed. Table 7 has the ratings for tree fruit, grape and small fruit crops. The crop groups are as follows: (1) peaches, apricots, nectarines, (2) sweet cherries, (3) sour cherries, (4) labrusca grapes, (5) vinifera grapes, (6) apples, pears, plums, (7) strawberries, raspberries and (8) currants and gooseberries. Table 8 indicates the ratings for several vegetable crops including: (1) broccoli, brussels sprouts, cauliflower, (2) bulb onions, garlic, (3) green (bunching) onions, (4) eggplants, peppers, (5) cucumbers, (6) muskmelons, (7) potatoes, (8) tomatoes, (9) sweet corn, (10) celery, lettuce and (11) pumpkins and squash.

(1) Climatic Considerations

The climate of the Niagara Region has been discussed in an earlier section of this report. The estimated climatic means and ranges for the Niagara Fruit Belt Climatic Region is most relevant to the discussion of special crops, since the crops which are most sensitive to climate are grown in the area of the Vinemount Moraine immediately above the Niagara Escarpment, and on the Iroquois Plain below the Escarpment.

The effect of climate on site selection for the special crops listed above, is variable. It is most important for the crops in Table 7. Of those crops, grapes and tender fruit crops are the most sensitive to climatic parameters. For grapes, it is probably more important than soil characteristics; for tender fruit crops, climate may be equally as important. Figure 11 is a map showing grape and tender fruit climatic zones in Niagara. The physiographic setting of each zone is identified, and the zones are numbered, in descending order of suitability, for grape and tender fruit crops, e.g. Zone 1 is the most suitable climatic area, and Zone 7 is the least suitable.

Additional recently published research on the effect of climate on horticultural crop production in southern Ontario, which was not incorporated in the rating scheme published herein, include Ross (8) and Brown and Place (18). Ross (8) has developed a system in which the area below the Niagara Escarpment was classified into three zones for tender fruit and grape production, based on the incidence of low winter temperatures and late spring frosts.

Brown and Place (18) have developed a climatic rating scheme for horticultural crops grown in southwestern Ontario. Crops were placed in three main groups as follows: frost susceptible, frost tolerant, and winter susceptible perennials. Land areas were placed in one of four categories: very good, good, fair and poor.

The importance of climate as it relates to special crop production in Niagara cannot be overemphasized. Users of the soil suitability ratings, especially those for tender fruit and grapes, should consider them in conjunction with the appropriate climatic information.

Climate is less critical in site selection for apples, pears, plums and small fruit crops. For these hardier fruit crops, the climate is most important for pears and plums, less important for apples, and least important for the small fruit crops.

(2) Soil Suitability Classes

The soil suitability classification for special crops consists of seven classes. The best soils, with no significant limitations for crop use, are designated as good. Soils designated with the ratings fair to good, fair, poor to fair, poor and very poor, have decreasing suitability for special crops. Soils with an unsuitable rating have no potential for special crops.

Good (G) — Soils with slight, if any, limitations to growth and yields.

Fair to Good (F-G) — Soils with moderate to slight limitations to growth and yields.

Fair (F) — Soils with moderate limitations to growth and yields.

Poor to Fair (P-F) — Soils with severe to moderate limitations to growth and yields.

Poor (P) — Soils with severe limitations to growth and yields.

Very Poor (VP) — Soils that have very severe limitations for crop growth.

Unsuitable (U) — Soils that have very severe limitations and are considered unsuitable for crop growth, even if drainage or irrigation are applied.

Assumptions

Before using the soil suitability tables it is important that the user has an understanding of the following assumptions upon which the classification is based. Although the following assumptions have been adapted from those outlined in The Canada Land Inventory Soil Classification for Agriculture (14), they also apply to the suitability ratings.

(a) Good soil management practices that are feasible and practical under a largely mechanized system of agriculture are assumed. These practices include a proper fertility program, management practices that result in good soil structure and crop growth, and management programs that result in minimum damage or risk of damage to the soil.

(b) Distance to markets, accessibility to transport, location, size of farm, field shape and accessibility to machinery, type of ownership, cultural patterns, skill or resources of individual operators, or hazards of crop damage by storms are not considered in this classification system.

(c) Soil suitability ratings are subject to change if new technology or management practices are widely adopted, e.g. drainage or irrigation, or as new information about crop yields or the behaviour and responses of the soils becomes available.

(3) How to Determine Special Crop Suitability Ratings from the Soil Map

1. Take any map unit designation from a final Niagara Region soil map.

e.g. $\frac{\text{BFO 6}}{\text{d} > \text{B}}$

Brantford (BFO) and Beverly (BVY) soils are the components of this map unit, as indicated by the legend on the soil map. This map unit contains approximately 70 percent of BFO soils and 30 percent of BVY soils.

2. To determine suitability ratings from the tables, first find the soil component name (in alphabetical order on the left hand side of the tables in the column entitled "Soil map unit component"). The symbol for that soil component is shown on the same line in the next column.

e.g. **Soil map unit component**	**Map symbol**
Brantford	BFO
Beverly	BVY

3. Next, move horizontally to the column entitled "Slope classes". Each soil map unit component is associated with a slope class, shown in the denominator of each map unit designation.

e.g. $\frac{\text{BFO 6}}{\text{d} > \text{B}}$

In this example, d slopes (5 - 9 percent) are associated with the dominant (approximately 70 percent) BFO map unit component, while B slopes (0 - 2 percent) are associated with the other (approximately 30 percent) BVY map unit component.

4. After determining the appropriate slope group, move horizontally in the table to the desired crop or crop group, e.g. from Table 7, Crop Group 4 — labrusca grapes. The soil suitability rating for labrusca grapes on Brantford soils on d slopes is P-F (Poor to Fair). Beverly soils on B slopes also have a P-F suitability rating. Because the ratings are the same, the map unit component is rated as P-F for labrusca grapes. The rating system consists of seven suitability ratings: Good (G), Fair to Good (F-G), Fair (F), Poor to Fair (P-F), Poor (P), Very Poor (VP) and Unsuitable (U).

5. After determining the soil suitability rating, move down vertically in the table to the rows that indicate whether ratings should change if management factors, such as drainage or irrigation, are being carried out. For example, the Poor to Fair rating for Brantford soils on d slopes will not change for labrusca grapes if the soils are drained or irrigated. But for the other component of the map unit symbol BFO 6, which is BVY, the rating on B slopes for labrusca grapes will change if drainage is improved. It will improve by +1 from P-F to F, with drainage. The soil suitability rating of the map unit is therefore 70 percent P-F and 30 percent F. If +1 was indicated opposite irrigation, the rating would also improve accordingly. When management factors would not be expected to affect the ratings, a dash (-) is shown. All ratings but G and U may be positively affected by drainage improvement, or by irrigation, on appropriate soils.

Table 6. Agricultural land suitability ratings for soybeans, white beans, spring canola and winter rapeseed in the Regional Municipality of Niagara

Soil map unit component	Map symbol	Slope classes	Management factor*	Crops soybeans	white beans	spring canola	winter rapeseed
Alluvium 1	1-ALU	B		U	U	U	U
		C,c		U	U	U	U
			Drainage	-	-	-	-
Alluvium 1 very shallow phase	1-ALU.V	B		U	U	U	U
		C,c		U	U	U	U
		D,d		U	U	U	U
			Drainage	-	-	-	-
Alluvium 2	2-ALU	B		P-F	P-F	P-F	P-F
		C,c		P-F	P	P	P
			Drainage	-	-	-	-
Alluvium 3	3-ALU	B		P-F	P-F	F	P-F
		C,c		P	P-F	P-F	P
			Drainage	-	-	-	-
Alluvium 4	4-ALU	B		P-F	P-F	P-F	P
		C,c		P	P	P	P
			Drainage	-	-	-	-
Bennington	BNG	B		G	G	G	F-G
		C,c		F-G	F-G	F-G	F
		D,d		F	P-F	F	P-F
		E,e		P-F	U	P-F	P
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Bennington red phase	BNG.R	B		G	G	G	F-G
		C,c		F-G	F-G	F-G	F
		D,d		F	P-F	F	P-F
		E,e		P-F	U	P-F	P
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Berrien	BRR	B		F	F	F	F
		C,c		P-F	P-F	F	F
		D,d		P	VP	P	P-F
			Drainage	+1	+1	+1	+1
Berrien red phase	BRR.R	B		F	F	F	F
		C,c		P-F	P-F	F	F
		D,d		P	VP	P	P-F
			Drainage	+1	+1	+1	+1
Berrien till phase	BRR.T	B		F	F	F	F
		C,c		P-F	P-F	F	F
		D,d		P	VP	P	P-F
			Drainage	+1	+1	+1	+1
Beverly	BVY	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P
		D,d		P-F	P	P	VP
			Drainage	+1	+1	+1	+1

**A significant improvement in the ratings as a result of drainage is indicated by +1, +2, etc. Where drainage would not be expected to affect the ratings, a dash (-) is shown.*

Table 6. Agricultural land suitability ratings for soybeans, white beans, spring canola and winter rapeseed in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factor*	Crops soybeans	white beans	spring canola	winter rapeseed
Beverly coarse phase	BVY.C	B		G	G	F-G	F
		C,c		F-G	F-G	F	P-F
		D,d		F	P-F	P-F	P
			Drainage	+1	+1	+1	+1
Beverly loamy phase	BVY.L	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P
		D,d		P-F	P	P	VP
			Drainage	+1	+1	+1	+1
Beverly loamy red phase	BVY.LR	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P
		D,d		P-F	P	P	VP
			Drainage	+1	+1	+1	+1
Beverly red phase	BVY.R	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P
		D,d		P-F	P	P	VP
			Drainage	+1	+1	+1	+1
Bookton	BOO	B		F-G	F-G	F-G	F-G
		C,c		F	F	F-G	F-G
		D,d		P-F	P	P-F	F
		E,e		P	U	P	P-F
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Bookton red phase	BOO.R	B		F-G	F-G	F-G	F-G
		C,c		F	F	F-G	F-G
		D,d		P-F	P	P-F	F
		E,e		P	U	P	P-F
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Brady	BAY	B		P-F	P-F	F	F-G
		C,c		P-F	P-F	F	F-G
		D,d		P	P	P-F	F
			Drainage	-	-	-	+1
Brady red phase	BAY.R	B		P-F	P-F	F	F-G
		C,c		P-F	P-F	F	F-G
		D,d		P	P	P-F	F
			Drainage	-	-	-	+1
Brant	BRT	B		G	G	G	F-G
		C,c		F-G	F-G	F-G	F
		D,d		F	P-F	F	P-F
		E,e		P-F	U	P-F	P
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Brant red phase	BRT.R	B		G	G	G	F-G
		C,c		F-G	F-G	F-G	F
		D,d		F	P-F	F	P-F

**A significant improvement in the ratings as a result of drainage is indicated by +1, +2, etc. Where drainage would not be expected to affect the ratings, a dash (-) is shown.*

Table 6. Agricultural land suitability ratings for soybeans, white beans, spring canola and winter rapeseed in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factor*	Crops soybeans	white beans	spring canola	winter rapeseed
Brant		E,e		P-F	U	P-F	P
red phase		F,f		U	U	U	U
(continued)		G,g		U	U	U	U
			Drainage	-	-	-	-
Brantford	BFO	B		G	G	F-G	F
		C,c		F-G	F-G	F	P-F
		D,d		F	P-F	P-F	P
		E,e		P-F	U	P	U
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Brantford	BFO.L	B		G	G	F-G	F
loamy phase		C,c		F-G	F-G	F	P-F
		D,d		F	P-F	P-F	P
		E,e		P-F	U	P	U
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Brantford	BFO.LR	B		G	G	F-G	F
loamy red phase		C,c		F-G	F-G	F	P-F
		D,d		F	P-F	P-F	P
		E,e		P-F	U	P	U
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Brantford	BFO.R	B		G	G	F-G	F
red phase		C,c		F-G	F-G	F	P-F
		D,d		F	P-F	P-F	P
		E,e		P-F	U	P	U
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Brooke	BOK.S	B		VP	VP	VP	VP
shallow phase		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2
Brooke	BOK.V	B		U	U	U	U
very shallow phase		C,c		U	U	U	U
			Drainage	-	-	-	-
Cashel	CSH	B		G	G	F-G	F
		C,c		F-G	F-G	F	P-F
		D,d		F	P-F	P-F	P
		E,e		P-F	U	P	P
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Cashel	CSH.HR	B		F-G	F-G	F	P-F
heavy red phase		C,c		F	F	P-F	P
		D,d		P-F	P	P	VP
		E,e		P	U	VP	VP

**A significant improvement in the ratings as a result of drainage is indicated by +1, +2, etc. Where drainage would not be expected to affect the ratings, a dash (-) is shown.*

Table 6. Agricultural land suitability ratings for soybeans, white beans, spring canola and winter rapeseed in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factor*	Crops soybeans	white beans	spring canola	winter rapeseed
Cashel heavy red phase (continued)		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Cashel red phase	CSH.R	B		G	G	F-G	F
		C,c		F-G	F-G	F	P-F
		D,d		F	P-F	P-F	P
		E,e		P-F	U	P	P
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Cashel washed phase	CSH.W	B		F-G	F-G	G	F-G
		C,c		F	F	F-G	P-F
		D,d		P-F	P	F	P
		E,e		P	U	P-F	P
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Chinguacousy	CGU	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P-F
		D,d		P-F	P	P	P
			Drainage	+1	+1	+1	+1
Chinguacousy coarse phase	CGU.C	B		G	G	F-G	F
		C,c		F-G	F-G	F	F
		D,d		F	F	P-F	P-F
			Drainage	+1	+1	+1	+1
Chinguacousy loamy phase	CGU.L	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P-F
		D,d		P-F	P	P	P
			Drainage	+1	+1	+1	+1
Chinguacousy loamy red phase	CGU.LR	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P-F
		D,d		P-F	P	P	P
			Drainage	+1	+1	+1	+1
Chinguacousy red phase	CGU.R	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P-F
		D,d		P-F	P	P	P
			Drainage	+1	+1	+1	+1
Chinguacousy red washed phase	CGU.RW	B		F	F	F-G	F
		C,c		P-F	P-F	F	P-F
		D,d		P	VP	P-F	P
			Drainage	+1	+1	+1	+1
Chinguacousy washed phase	CGU.W	B		F	F	F-G	F
		C,c		P-F	P-F	F	P-F
		D,d		P	VP	P-F	P
			Drainage	+1	+1	+1	+1
Colwood	CWO	B		P	P	P	P
		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2

**A significant improvement in the ratings as a result of drainage is indicated by +1, +2, etc. Where drainage would not be expected to affect the ratings, a dash (-) is shown.*

Table 6. Agricultural land suitability ratings for soybeans, white beans, spring canola and winter rapeseed in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factor*	Crops soybeans	white beans	spring canola	winter rapeseed
Colwood red phase	CWO.R	B		P	P	P	P
		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2
Complex 1	CPX 1					NOT RATED	
Complex 7	CPX 7					NOT RATED	
Escarpment	ESC					NOT RATED	
Farmington	FRM	B		U	U	U	U
		C,c		U	U	U	U
		D,d		U	U	U	U
		E,e		U	U	U	U
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Farmington shallow phase	FRM.S	B		F	F	F	F
		C,c		P-F	P-F	P-F	P-F
		D,d		P	U	P	P
		E,e		U	U	U	P
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Farmington very shallow phase	FRM.V	B		P-F	P-F	P-F	P-F
		C,c		P	P	P	P
		D,d		U	U	U	U
		E,e		U	U	U	U
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Flamborough	FMB	B		P	P	P	P
		C,c		P	P	VP	VP
			Drainage	+2	+2	+2	+3
Flamborough brown phase	FMB.B	B		P	P	P	P
		C,c		P	P	VP	VP
			Drainage	+2	+2	+2	+3
Fonthill	FNT	B		P-F	P-F	F	G
		C,c		P-F	P-F	F	G
		D,d		P	P	P-F	F-G
		E,e		P	U	P	F
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Fox	FOX	B		P-F	P-F	F	G
		C,c		P-F	P-F	F	G
		D,d		P	P	P-F	F-G
		E,e		P	U	P	F
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-

**A significant improvement in the ratings as a result of drainage is indicated by +1, +2, etc. Where drainage would not be expected to affect the ratings, a dash (-) is shown.*

Table 6. Agricultural land suitability ratings for soybeans, white beans, spring canola and winter rapeseed in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factor*	Crops soybeans	white beans	spring canola	winter rapeseed
Fox	FOX.R	B		P-F	P-F	F	G
red phase		C,c		P-F	P-F	F	G
		D,d		P	P	P-F	F-G
		E,e		P	U	P	F
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Franktown	FKW.S	B		P-F	P-F	P-F	P-F
shallow phase		C,c		P	P	P	P
		D,d		VP	VP	VP	VP
			Drainage	+1	+1	+1	+1
Franktown	FKW.V	B		P-F	P-F	P-F	P-F
very shallow phase		C,c		P	P	P	P
		D,d		U	U	U	U
			Drainage	-	-	-	-
Granby	GNY	B		VP	VP	P	P
		C,c		VP	VP	P	P
			Drainage	+2	+2	+2	+3
Granby	GNY.PR	B		U	U	VP	VP
peaty red phase		C,c		U	U	VP	VP
			Drainage	-	-	+2	+2
Grimsby	GMY	B		F-G	F-G	F-G	G
		C,c		F	F	F	F-G
		D,d		P-F	U	P-F	F
		E,e		P	U	P	P-F
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Grimsby	GMY.B	B		F-G	F-G	F-G	G
brown phase		C,c		F	F	F	F-G
		D,d		P-F	U	P-F	F
		E,e		P	U	P	P-F
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Haldimand	HIM	B		F	F	P-F	P
		C,c		P-F	P-F	P	VP
		D,d		P	VP	U	U
			Drainage	+1	+1	+1	+1
Haldimand	HIM.C	B		F-G	F-G	F	P-F
coarse phase		C,c		F	F	P-F	P
		D,d		P-F	P	VP	VP
			Drainage	+1	+1	+1	+1
Haldimand	HIM.L	B		F	F	P-F	P
loamy phase		C,c		P-F	P-F	P	VP
		D,d		P	VP	U	U
			Drainage	+1	+1	+1	+1

**A significant improvement in the ratings as a result of drainage is indicated by +1, +2, etc. Where drainage would not be expected to affect the ratings, a dash (-) is shown.*

Table 6. Agricultural land suitability ratings for soybeans, white beans, spring canola and winter rapeseed in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factor*	Crops soybeans	white beans	spring canola	winter rapeseed
Holly	HOY	B		VP	VP	VP	VP
			Drainage	+4	+4	+4	+4
Jeddo	JDD	B		P	P	P	P
		C,c		VP	VP	VP	P
			Drainage	+2	+2	+2	+2
Jeddo loamy phase	JDD.L	B		P	P	P	P
		C,c		VP	VP	VP	P
			Drainage	+2	+2	+2	+2
Jeddo loamy red phase	JDD.LR	B		P	P	P	P
		C,c		VP	VP	VP	P
			Drainage	+2	+2	+2	+2
Jeddo red phase	JDD.R	B		P	P	P	P
		C,c		VP	VP	VP	P
			Drainage	+2	+2	+2	+2
Jeddo red washed phase	JDD.RW	B		VP	VP	P-F	P-F
		C,c		U	U	P	P
			Drainage	+2	+2	+2	+2
Jeddo washed phase	JDD.W	B		VP	VP	P-F	P-F
		C,c		U	U	P	P
			Drainage	+2	+2	+2	+2
Lincoln	LIC	B		VP	VP	VP	VP
		C,c		VP	VP	VP	VP
			Drainage	+1	+1	+1	+1
Lincoln coarse phase	LIC.C	B		P	P	P	P
		C,c		P	P	P	P
			Drainage	+1	+1	+1	+1
Lincoln loamy phase	LIC.L	B		VP	VP	VP	VP
		C,c		VP	VP	VP	VP
			Drainage	+1	+1	+1	+1
Lincoln peaty phase	LIC.P	B		U	U	U	U
		C,c		U	U	U	U
			Drainage	-	-	-	-
Lorraine	LRR	B		VP	VP	VP	VP
			Drainage	+2	+2	+4	+4
Malton	MAT	B		P	P	P	VP
		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2
Malton heavy phase	MAT.H	B		VP	VP	VP	U
		C,c		U	U	U	U
			Drainage	+2	+2	+2	+2
Malton heavy red phase	MAT.HR	B		VP	VP	VP	U
		C,c		U	U	U	U
			Drainage	+2	+2	+2	+2

**A significant improvement in the ratings as a result of drainage is indicated by +1, +2, etc. Where drainage would not be expected to affect the ratings, a dash (-) is shown.*

Table 6. Agricultural land suitability ratings for soybeans, white beans, spring canola and winter rapeseed in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factor*	Crops soybeans	white beans	spring canola	winter rapeseed
Malton loamy red phase	MAT.LR	B		P	P	P	VP
		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2
Malton red phase	MAT.R	B		P	P	P	VP
		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2
Maplewood	MPW	B		P	P	P	P
		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2
Maplewood red phase	MPW.R	B		P	P	P	P
		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2
Maplewood till phase	MPW.T	B		P	P	P	P
		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2
Maplewood till red phase	MPW.TR	B		P	P	P	P
		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2
Marsh	MAR	B				NOT RATED	
Morley	MOY	B		P	P	P	P
		C,c		VP	VP	VP	P
			Drainage	+2	+2	+2	+2
Morley shallow phase	MOY.S	B		P	P	P	P
		C,c		VP	VP	VP	P
			Drainage	+2	+2	+2	+2
Niagara	NGR	B		F	F	P-F	P
		C,c		P-F	P-F	P	VP
		D,c		P	VP	U	U
			Drainage	+1	+1	+1	+1
Niagara loamy phase	NGR.L	B		F	F	P-F	P
		C,c		P-F	P-F	P	VP
		C,d		P	VP	U	U
			Drainage	+1	+1	+1	+1
Not Mapped	NM					NOT RATED	
Oneida	OID	B		G	G	F-G	F
		C,c		F-G	F-G	F	F
		D,d		F	P-F	P-F	P-F
		E,e		P-F	U	P	P
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Oneida loamy phase	OID.L	B		G	G	F-G	F
		C,c		F-G	F-G	F	F
		D,d		F	P-F	P-F	P-F
		E,e		P-F	U	P	P

**A significant improvement in the ratings as a result of drainage is indicated by +1, +2, etc. Where drainage would not be expected to affect the ratings, a dash (-) is shown.*

Table 6. Agricultural land suitability ratings for soybeans, white beans, spring canola and winter rapeseed in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factor*	Crops soybeans	white beans	spring canola	winter rapeseed
Oneida		F,f		U	U	U	U
loamy phase		G,g		U	U	U	U
(continued)			Drainage	-	-	-	-
Oneida	OID.LR	B		G	G	F-G	F
loamy red phase		C,c		F-G	F-G	F	F
		D,d		F	P-F	P-F	P-F
		E,e		P-F	U	P	P
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Oneida	OID.R	B		G	G	F-G	F
red phase		C,c		F-G	F-G	F	F
		D,d		F	P-F	P-F	P-F
		E,e		P-F	U	P	P
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Oneida	OID.RW	B		F-G	F-G	G	F-G
red washed phase		C,c		F	F	F-G	F
		D,d		P-F	P	F	P-F
		E,e		P	U	P-F	P
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Oneida	OID.W	B		F-G	F-G	G	F-G
washed phase		C,c		F	F	F-G	F
		D,d		P-F	P	F	P-F
		E,e		P	U	P-F	P
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Ontario	OTI	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P
		D,d		P-F	P	P	U
		E,e		P-F	U	P	U
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Peel	PEL	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P
		D,d		P-F	P	P	VP
			Drainage	+1	+1	+1	+1
Peel	PEL.C	B		G	G	F-G	F
coarse phase		C,c		F-G	F-G	F	P-F
		D,d		F	P-F	P-F	P
			Drainage	+1	+1	+1	+1
Peel	PEL.H	B		F	F	P-F	P
heavy phase		C,c		P-F	P-F	P	VP
		D,d		P	VP	VP	U
			Drainage	+1	+1	+1	+1

**A significant improvement in the ratings as a result of drainage is indicated by +1, +2, etc. Where drainage would not be expected to affect the ratings, a dash (-) is shown.*

Table 6. Agricultural land suitability ratings for soybeans, white beans, spring canola and winter rapeseed in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factor*	Crops soybeans	white beans	spring canola	winter rapeseed
Peel	PEL.HR	B		F	F	P-F	P
heavy red phase		C,c		P-F	P-F	P	VP
		D,d		P	VP	VP	U
			Drainage	+1	+1	+1	+1
Peel	PEL.L	B		F-G	F-G	F	P-F
loamy phase		C,c		F	F	P-F	P
		D,d		P-F	P	P	VP
			Drainage	+1	+1	+1	+1
Peel	PEL.LR	B		F-G	F-G	F	P-F
loamy red phase		C,c		F	F	P-F	P
		D,d		P-F	P	P	VP
			Drainage	+1	+1	+1	+1
Peel	PEL.R	B		F-G	F-G	F	P-F
red phase		C,c		F	F	P-F	P
		D,d		P-F	P	P	VP
			Drainage	+1	+1	+1	+1
Plainfield	PFD	B		P-F	P-F	F	F-G
		C,c		P-F	P-F	F	F-G
			Drainage	-	-	-	-
Plainfield	PFD.D	D,d		P	U	P-F	F
dune phase		E,e		P	U	P	P-F
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Port Colborne	PCE	B		VP	VP	VP	VP
			Drainage	+2	+2	+4	+4
Portsmouth	PUH	B		VP	VP	VP	VP
			Drainage	+2	+2	+4	+4
Quarry	QRY	B		VP	VP	VP	VP
			Drainage	+4	+4	+4	+4
Ridgeville	RVE	B		P-F	P-F	F	F-G
		C,c		P-F	P-F	F	F-G
		D,d		P	U	P-F	F
			Drainage	-	-	-	+1
Sherkston	SRK	B		VP	VP	VP	VP
			Drainage	+4	+4	+4	+4
Silver Hill	SIH	B		P	P	P	P-F
		C,c		VP	VP	P	P-F
			Drainage	+2	+2	+2	+2
Smithville	SHV	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P
		D,d		P-F	P	P	U
		E,e		P-F	U	P	U
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-

**A significant improvement in the ratings as a result of drainage is indicated by +1, +2, etc. Where drainage would not be expected to affect the ratings, a dash (-) is shown.*

Table 6. Agricultural land suitability ratings for soybeans, white beans, spring canola and winter rapeseed in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factor*	Crops soybeans	white beans	spring canola	winter rapeseed
Smithville loamy phase	SHV.L	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P
		D,d		P-F	P	P	U
		E,e		P-F	U	P	U
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Tavistock	TVK	B		F-G	F-G	F-G	F
		C,c		F	F	F	P-F
		D,d		P-F	P	P-F	P
			Drainage	+1	+1	+1	+1
Tavistock heavy red phase	TVK.HR	B		F-G	F	F	P-F
		C,c		F	P-F	P-F	P
		D,d		P-F	VP	P	VP
			Drainage	+1	+1	+1	+1
Tavistock red phase	TVK.R	B		F-G	F-G	F-G	F
		C,c		F	F	F	P-F
		D,d		P-F	P	P-F	P
			Drainage	+1	+1	+1	+1
Tavistock till phase	TVK.T	B		F-G	F-G	F-G	F
		C,c		F	F	F	P-F
		D,d		P-F	P	P-F	P
			Drainage	+1	+1	+1	+1
Tavistock till red phase	TVK.TR	B		F-G	F-G	F-G	F
		C,c		F	F	F	P-F
		D,d		P-F	P	P-F	P
			Drainage	+1	+1	+1	+1
Toledo	TLD	B		P	P	P	VP
		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2
Toledo coarse phase	TLD.C	B		P-F	P-F	P-F	P
		C,c		P	P	P	P
			Drainage	+2	+2	+2	+2
Toledo loamy phase	TLD.L	B		P	P	P	VP
		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2
Toledo loamy red phase	TLD.LR	B		P	P	P	VP
		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2
Toledo peaty phase	TLD.P	B		U	U	U	U
		C,c		U	U	U	U
			Drainage	-	-	-	-
Toledo red phase	TLD.R	B		P	P	P	VP
		C,c		VP	VP	VP	VP
			Drainage	+2	+2	+2	+2

**A significant improvement in the ratings as a result of drainage is indicated by +1, +2, etc. Where drainage would not be expected to affect the ratings, a dash (-) is shown.*

Table 6. Agricultural land suitability ratings for soybeans, white beans, spring canola and winter rapeseed in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factor*	Crops			
				soybeans	white beans	spring canola	winter rapeseed
Trafalgar	TFG	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P-F
		D,d		P-F	P	P	VP
			Drainage	+1	+1	+1	+1
Trafalgar loamy phase	TFG.L	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P-F
		D,d		P-F	P	P	VP
			Drainage	+1	+1	+1	+1
Trafalgar shallow phase	TFG.S	B		F-G	F-G	F	P-F
		C,c		F	F	P-F	P-F
		D,d		P-F	P	P	VP
			Drainage	+1	+1	+1	+1
Tuscola	TUC	B		F-G	F-G	F-G	F
		C,c		F	F	F	P-F
		D,d		P-F	P	P-F	P
			Drainage	+1	+1	+1	+1
Tuscola red phase	TUC.R	B		F-G	F-G	F-G	F
		C,c		F	F	F	P-F
		D,d		P-F	P	P-F	P
			Drainage	+1	+1	+1	+1
Vineland	VLD	B		F	F	F-G	F-G
		C,c		P-F	P-F	F	F
		D,d		P	U	P-F	P-F
			Drainage	-	-	-	+1
Vineland brown phase	VLD.B	B		F	F	F-G	F-G
		C,c		P-F	P-F	F	F
		D,d		P	U	P-F	P-F
			Drainage	-	-	-	+1
Vittoria	VIT.R	B		F	F	F	F
		C,c		P-F	P-F	F	F
		D,d		P	VP	P	P-F
			Drainage	+1	+1	+1	+1
Vittoria red phase	VIT.R	B		F	F	F	F
		C,c		P-F	P-F	F	F
		D,d		P	VP	P	P-F
			Drainage	+1	+1	+1	+1
Wainfleet	WAF	B		VP	VP	VP	VP
			Drainage	+2	+2	+4	+4
Walsher	WSH	B		F-G	F-G	F-G	F-G
		C,c		F	F	F-G	F-G
		D,d		P	P	P-F	F
		E,e		P	U	P	P-F
		F,f		U	U	U	U
		G,g		U	U	U	U
			Drainage	-	-	-	-
Walsingham	WAM	B		P-F	P-F	F	F
		C,c		P-F	P-F	F	F

**A significant improvement in the ratings as a result of drainage is indicated by +1, +2, etc. Where drainage would not be expected to affect the ratings, a dash (-) is shown.*

Table 6. Agricultural land suitability ratings for soybeans, white beans, spring canola and winter rapeseed in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factor*	Crops soybeans	white beans	spring canola	winter rapeseed
Walsingham (continued)		D,d		P	U	P-F	P-F
			Drainage	-	-	-	+1
Wauseon	WUS	B		P	P	P	P-F
		C,c		VP	VP	P	P-F
			Drainage	+2	+2	+2	+2
Welland	WLL	B		VP	VP	VP	VP
		C,c		VP	VP	VP	VP
			Drainage	+1	+1	+1	+1
Welland loamy phase	WLL.L	B		VP	VP	VP	VP
		C,c		VP	VP	VP	VP
			Drainage	+1	+1	+1	+1
Welland peaty phase	WLL.P	B		U	U	U	U
		C,c		U	U	U	U
			Drainage	-	-	-	-

**A significant improvement in the ratings as a result of drainage is indicated by +1, +2, etc. Where drainage would not be expected to affect the ratings, a dash (-) is shown.*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Alluvium 1	1-ALU	B		U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Alluvium 1 very shallow phase	1-ALU.V	B		U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U
		D,d		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Alluvium 2	2-ALU	B		U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Alluvium 3	3-ALU	B		U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Alluvium 4	4-ALU	B		U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Bennington	BNG	B		F	P-F	F	G	F-G	F-G	F-G	F-G	G
		C,c		F	P-F	F	G	F-G	F-G	F-G	F-G	G
		D,d		P-F	P-F	P-F	F-G	F	F-G	F-G	F	F-G
		E,e		P-F	U	U	F-G	F	F	F	P-F	F
		F,f		U	U	U	U	U	P-F	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+1	-	-	-	-	-	-	+1	-
Bennington red phase	BNG.R	B		F	P-F	F	G	F-G	F-G	F-G	F-G	G
		C,c		F	P-F	F	G	F-G	F-G	F-G	F-G	G
		D,d		P-F	P-F	P-F	F-G	F	F-G	F-G	F	F-G
		E,e		P-F	U	U	F-G	F	F	F	P-F	F
		F,f		U	U	U	U	U	P-F	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+1	-	-	-	-	-	-	+1	-
Berrien	BRR	B		P-F	P	P-F	F	F	F	F	F	P-F
		C,c		P-F	P	P-F	F	F	F	F	F	P-F
		D,d		P	P	P	P-F	P-F	F	F	F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	+1	-	-	-	-	-	-	+1	-
Berrien red phase	BRR.R	B		P-F	P	P-F	F	F	F	F	F	P-F
		C,c		P-F	P	P-F	F	F	F	F	F	P-F

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

** **Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Berrien		D,d		P	P	P	P-F	P-F	F	F	F	P
red phase			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
(continued)			Irrigation	+1	-	-	-	-	-	-	+1	-
Berrien	BRR.T	B		P-F	P	P-F	F	F	F	F	F	P-F
till phase		C,c		P-F	P	P-F	F	F	F	F	F	P-F
		D,d		P	P	P	P-F	P-F	F	F	F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	+1	-	-	-	-	-	-	+1	-
Beverly	BVY	B		U	U	U	P-F	P-F	P-F	F	P	P-F
		C,c		U	U	U	P-F	P-F	P-F	F	P	P-F
		D,d		U	U	U	P	P	P-F	F	P	P
			Drainage	-	-	-	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Beverly	BVY.C	B		U	U	U	P-F	F	P-F	F	P-F	P-F
coarse phase		C,c		U	U	U	P-F	F	P-F	F	P-F	P-F
		D,d		U	U	U	P	P-F	P-F	F	P-F	P
			Drainage	-	-	-	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Beverly	BVY.L	B		U	U	U	P-F	F	P-F	F	P	P-F
loamy phase		C,c		U	U	U	P-F	F	P-F	F	P	P-F
		D,d		U	U	U	P	P-F	P-F	F	P	P
			Drainage	-	-	-	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Beverly	BVY.LR	B		U	U	U	P-F	F	P-F	F	P	P-F
loamy red phase		C,c		U	U	U	P-F	F	P-F	F	P	P-F
		D,d		U	U	U	P	P-F	P-F	F	P	P
			Drainage	-	-	-	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Beverly	BVY.R	B		U	U	U	P-F	P-F	P-F	F	P	P-F
red phase		C,c		U	U	U	P-F	P-F	P-F	F	P	P-F
		D,d		U	U	U	P	P	P-F	F	P	P
			Drainage	-	-	-	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Bookton	BOO	B		F	P-F	F	F-G	F-G	F-G	F-G	F-G	F
		C,c		F	P-F	F	F-G	F-G	F-G	F-G	F-G	F
		D,d		P-F	P-F	P-F	F	F	F-G	F-G	F	P-F
		E,e		P-F	P	U	F	F	F	F	P-F	P
		F,f		U	U	U	U	U	P-F	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+1	-	-	-	-	+1	-	+1	+1
Bookton	BOO.R	B		F	P-F	F	F-G	F-G	F-G	F-G	F-G	F
red phase		C,c		F	P-F	F	F-G	F-G	F-G	F-G	F-G	F
		D,d		P-F	P-F	P-F	F	F	F-G	F-G	F	P-F

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Bookton red phase (continued)		E,e		P-F	P	U	F	F	F	F	P-F	P
		F,f		U	U	U	U	U	P-F	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+1	-	-	-	-	+1	-	+1	+1
Brady	BAY	B		P-F	F	F	P-F	P-F	P-F	P-F	P-F	P
		C,c		P-F	F	F	P-F	P-F	P-F	P-F	P-F	P
		D,d		P-F	F	P-F	P	P	P-F	P-F	P	U
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	-
			Irrigation	+2	+1	+1	-	+2	+1	+1	+1	-
Brady red phase	BAY.R	B		P-F	F	F	P-F	P-F	P-F	P-F	P-F	P
		C,c		P-F	F	F	P-F	P-F	P-F	P-F	P-F	P
		D,d		P-F	F	P-F	P	P	P-F	P-F	P	U
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	-
			Irrigation	+2	+1	+1	-	+2	+1	+1	+1	-
Brant	BRT	B		F-G	F	F-G	G	G	F-G	F-G	F-G	G
		C,c		F-G	F	F-G	G	G	F-G	F-G	F-G	G
		D,d		F	F	P-F	F-G	F-G	F-G	F-G	F	F-G
		E,e		F	P	U	F-G	F-G	F	F	P-F	F
		F,f		U	U	U	U	U	P-F	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+1	-	-	-	-	-	-	+1	-
Brant red phase	BRT.R	B		F-G	F	F-G	G	G	F-G	F-G	F-G	G
		C,c		F-G	F	F-G	G	G	F-G	F-G	F-G	G
		D,d		F	F	P-F	F-G	F-G	F-G	F-G	F	F-G
		E,e		F	P	U	F-G	F-G	F	F	P-F	F
		F,f		U	U	U	U	U	P-F	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+1	-	-	-	-	-	-	+1	-
Brantford	BFO	B		U	U	U	F	F	F	F-G	P-F	F
		C,c		U	U	U	F	F	F	F-G	P-F	F
		D,d		U	U	U	P-F	P-F	F	F-G	P	P-F
		E,e		U	U	U	P-F	P-F	P-F	F	P	P
		F,f		U	U	U	U	U	P	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Brantford loamy phase	BFO.L	B		U	U	U	F	F-G	F	F-G	P-F	F
		C,c		U	U	U	F	F-G	F	F-G	P-F	F
		D,d		U	U	U	P-F	F	F	F-G	P	P-F
		E,e		U	U	U	P-F	F	P-F	F	P	P
		F,f		U	U	U	U	U	P	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

** **Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Brantford loamy red phase	BFO.LR	B		U	U	U	F	F-G	F	F-G	P-F	F
		C,c		U	U	U.	F	F-G	F	F-G	P-F	F
		D,d		U	U	U	P-F	F	F	F-G	P	P-F
		E,e		U	U	U	P-F	F	P-F	F	P	P
		F,f		U	U	U	U	U	P	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Brantford red phase	BFO.R	B		U	U	U	F	F	F	F-G	P-F	F
		C,c		U	U	U	F	F	F	F-G	P-F	F
		D,d		U	U	U	P-F	P-F	F	F-G	P	P-F
		E,e		U	U	U	P-F	P-F	P-F	F	P	P
		F,f		U	U	U	U	U	P	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Brooke shallow phase	BOK.S	B		U	U	U	VP	VP	VP	U	VP	VP
		C,c		U	U	U	VP	VP	VP	U	VP	VP
			Drainage	-	-	-	+2	+2	+1	-	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-
Brooke very shallow phase	BOK.V	B		U	U	U	P	U	U	U	U	U
		C,c		U	U	U	P	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Cashel	CSH	B		P	P	P	F	F	F	F-G	P-F	F
		C,c		P	P	P	F	F	F	F-G	P-F	F
		D,d		U	P	U	P-F	P-F	F	F-G	P	P-F
		E,e		U	U	U	P-F	P-F	P-F	F	P	P
		F,f		U	U	U	U	U	P	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Cashel heavy red phase	CSH.HR	B		U	U	U	P	P	P-F	F	P	P-F
		C,c		U	U	U	P	P	P-F	F	P	P-F
		D,d		U	U	U	U	U	P-F	F	U	P
		E,e		U	U	U	U	U	P	P-F	U	U
		F,f		U	U	U	U	U	U	P	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Cashel red phase	CSH.R	B		P	P	P	F	F	F	F-G	P-F	F
		C,c		P	P	P	F	F	F	F-G	P-F	F
		D,d		U	P	U	P-F	P-F	F	F-G	P	P-F
		E,e		U	U	U	P-F	P-F	P-F	F	P	P
		F,f		U	U	U	U	U	P	P-F	U	U

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Cashel		G,g		U	U	U	U	U	U	U	U	U
red phase			Drainage	-	-	-	-	-	-	-	-	-
(continued)			Irrigation	-	-	-	-	-	-	-	-	-
Cashel	CSH.W	B		P-F	P-F	P-F	F	F-G	F	F-G	P-F	F
washed phase		C,c		P-F	P-F	P-F	F	F-G	F	F-G	P-F	F
		D,d		P	P-F	P	P-F	F	F	F-G	P	P-F
		E,e		P	P	U	P-F	F	P-F	F	P	P
		F,f		P	U	U	U	U	P	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Chinguacousy	CGU	B		P	VP	P	F	P-F	F	F-G	P-F	F-G
		C,c		P	VP	P	F	P-F	F	F-G	P-F	F-G
		D,d		VP	VP	VP	P-F	P	F	F-G	P	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Chinguacousy	CGU.C	B		P	VP	P	F	F	F	F-G	F	F-G
coarse phase		C,c		P	VP	P	F	F	F	F-G	F	F-G
		D,d		VP	VP	VP	P-F	P-F	F	F-G	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Chinguacousy	CGU.L	B		P	VP	P	F	F	F	F-G	P-F	F-G
loamy phase		C,c		P	VP	P	F	F	F	F-G	P-F	F-G
		D,d		VP	VP	VP	P-F	P-F	F	F-G	P	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Chinguacousy	CGU.LR	B		P	VP	P	F	F	F	F-G	P-F	F-G
loamy red phase		C,c		P	VP	P	F	F	F	F-G	P-F	F-G
		D,d		VP	VP	VP	P-F	P-F	F	F-G	P	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Chinguacousy	CGU.R	B		P	VP	P	F	P-F	F	F-G	P-F	F-G
red phase		C,c		P	VP	P	F	P-F	F	F-G	P-F	F-G
		D,d		VP	VP	VP	P-F	P	F	F-G	P	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Chinguacousy	CGU.RW	B		P-F	P	P-F	F	F	F	F-G	P-F	F-G
red washed phase		C,c		P-F	P	P-F	F	F	F	F-G	P-F	F-G
		D,d		P	P	P	P-F	P-F	F	F-G	P	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Chinguacousy washed phase	CGU.W	B		P-F	P	P-F	F	F	F	F-G	P-F	F-G
		C,c		P-F	P	P-F	F	F	F	F-G	P-F	F-G
		D,d		P	P	P	P-F	P-F	F	F-G	P	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Colwood	CWO	B		VP	VP	VP	VP	VP	P	P	VP	P
		C,c		VP	VP	VP	VP	VP	P	P	VP	P
			Drainage	+2	+1	+1	+2	+2	+2	+2	+3	+2
			Irrigation	+1	-	-	-	-	-	-	-	-
Colwood red phase	CWO.R	B		VP	VP	VP	VP	VP	P	P	VP	P
		C,c		VP	VP	VP	VP	VP	P	P	VP	P
			Drainage	+2	+1	+1	+2	+2	+2	+2	+3	+2
			Irrigation	+1	-	-	-	-	-	-	-	-
Complex 1	CPX 1			NOT RATED								
Complex 7	CPX 7			NOT RATED								
Escarpment	ESC			NOT RATED								
Farmington	FRM	B		U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U
		D,d		U	U	U	U	U	U	U	U	U
		E,e		U	U	U	U	U	U	U	U	U
		F,f		U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Farmington shallow phase	FRM.S	B		U	U	U	F	F	P	U	F	F
		C,c		U	U	U	F	F	P	U	F	F
		D,d		U	U	U	P-F	P-F	P	U	P-F	P-F
		E,e		U	U	U	P-F	P-F	P	U	P	P
		F,f		U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	+1	-
Farmington very shallow phase	FRM.V	B		U	U	U	VP	VP	U	U	P-F	P-F
		C,c		U	U	U	VP	VP	U	U	P-F	P-F
		D,d		U	U	U	U	VP	U	U	P	P
		E,e		U	U	U	U	U	U	U	P	P
		F,f		U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	+2	-	-	-	+1	+1

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Flamborough	FMB	B		VP	VP	VP	VP	VP	VP	P	VP	VP
		C,c		VP	VP	VP	VP	VP	VP	P	VP	VP
			Drainage	+2	+2	+2	+2	+2	+2	+2	+3	+2
			Irrigation	+1	-	-	-	-	-	-	-	-
Flamborough brown phase	FMB.B	B		VP	VP	VP	VP	VP	VP	P	VP	VP
		C,c		VP	VP	VP	VP	VP	VP	P	VP	VP
			Drainage	+2	+2	+2	+2	+2	+2	+2	+3	+2
			Irrigation	+1	-	-	-	-	-	-	-	-
Fonthill	FNT	B		F-G	F-G	F-G	F	F	F	F	F	P-F
		C,c		F-G	F-G	F-G	F	F	F	F	F	P-F
		D,d		F	F-G	F	P-F	P-F	F	F	P-F	P
		E,e		F	P-F	U	U	P-F	P-F	P-F	P	P
		F,f		U	U	U	U	U	P	P	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+1	+1	+1	+1	+2	+1	+1	+1	+1
Fox	FOX	B		F	F-G	F-G	F	F	F	F	F	P-F
		C,c		F	F-G	F-G	F	F	F	F	F	P-F
		D,d		P-F	F-G	F	P-F	P-F	F	F	P-F	P
		E,e		P-F	P-F	U	P-F	P-F	P-F	P-F	P	P
		F,f		U	U	U	U	U	P	P	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+2	+1	+1	+1	+2	+1	+1	+1	+1
Fox red phase	FOX.R	B		F	F-G	F-G	F	F	F	F	F	P-F
		C,c		F	F-G	F-G	F	F	F	F	F	P-F
		D,d		P-F	F-G	F	P-F	P-F	F	F	P-F	P
		E,e		P-F	P-F	U	P-F	P-F	P-F	P-F	P	P
		F,f		U	U	U	U	U	P	P	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+2	+1	+1	+1	+2	+1	+1	+1	+1
Franktown shallow phase	FKW.S	B		U	U	U	P-F	P-F	VP	U	P-F	P-F
		C,c		U	U	U	P-F	P-F	VP	U	P-F	P-F
		D,d		U	U	U	P	P	VP	U	P	P
			Drainage	-	-	-	+2	+1	+1	-	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Franktown very shallow phase	FKW.V	B		U	U	U	P-F	U	U	U	P	P
		C,c		U	U	U	P-F	U	U	U	P	P
		D,d		U	U	U	P	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Granby	GNY	B		VP	VP	VP	VP	VP	VP	P	VP	VP
		C,c		VP	VP	VP	VP	VP	VP	P	VP	VP
			Drainage	+2	+2	+2	+2	+2	+2	+2	+2	+1
			Irrigation	-	-	-	-	+1	-	-	-	-
Granby peaty red phase	GNY.PR	B		U	U	U	U	U	U	VP	U	U
		C,c		U	U	U	U	U	U	VP	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Grimsby	GMY	B		F-G	F	G	F-G	G	F-G	F-G	F-G	F
		C,c		F-G	F	G	F-G	G	F-G	F-G	F-G	F
		D,d		F	F	F	F	F-G	F-G	F-G	F	P-F
		E,e		F	P	U	F	F-G	F	P-F	P-F	P
		F,f		U	U	U	U	U	P-F	P	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+1	-	-	-	-	+1	+1	+1	+1
Grimsby brown phase	GMY.B	B		F-G	F	G	F-G	G	F-G	F-G	F-G	F
		C,c		F-G	F	G	F-G	G	F-G	F-G	F-G	F
		D,d		F	F	F	F	F-G	F-G	F-G	F	P-F
		E,e		F	P	U	F	F-G	F	P-F	P-F	P
		F,f		U	U	U	U	U	P-F	P	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+1	-	-	-	-	+1	+1	+1	+1
Haldimand	HIM	B		U	U	U	P	VP	P	P-F	U	P
		C,c		U	U	U	P	VP	P	P-F	U	P
		D,d		U	U	U	VP	U	P	P-F	U	VP
			Drainage	-	-	-	+1	+1	+1	+1	-	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Haldimand coarse phase	HIM.C	B		U	U	U	P	P	P	P-F	VP	P
		C,c		U	U	U	P	P	P	P-F	VP	P
		D,d		U	U	U	VP	VP	P	P-F	U	VP
			Drainage	-	-	-	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Haldimand loamy phase	HIM.L	B		U	U	U	P	P	P	P-F	U	P
		C,c		U	U	U	P	P	P	P-F	U	P
		D,d		U	U	U	VP	VP	P	P-F	U	VP
			Drainage	-	-	-	+1	+1	+1	+1	-	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Holly	HOY	B		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Jeddo	JDD	B		VP	VP	VP	VP	VP	VP	P	VP	P
		C,c		VP	VP	VP	VP	VP	VP	P	VP	P
			Drainage	+1	+1	+1	+2	+2	+2	+2	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

** **Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Jeddo	JDD.L	B		VP	VP	VP	VP	P	VP	P	VP	P
loamy phase		C,c		VP	VP	VP	VP	P	VP	P	VP	P
			Drainage	+1	+1	+1	+2	+2	+2	+2	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-
Jeddo	JDD.LR	B		VP	VP	VP	VP	P	VP	P	VP	P
loamy red phase		C,c		VP	VP	VP	VP	P	VP	P	VP	P
			Drainage	+1	+1	+1	+2	+2	+2	+2	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-
Jeddo	JDD.R	B		VP	VP	VP	VP	VP	VP	P	VP	P
red phase		C,c		VP	VP	VP	VP	VP	VP	P	VP	P
			Drainage	+1	+1	+1	+2	+2	+2	+2	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-
Jeddo	JDD.RW	B		P	P	P	VP	P	VP	P	VP	P
red washed phase		C,c		P	P	P	VP	P	VP	P	VP	P
			Drainage	+1	+1	+1	+2	+2	+2	+2	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-
Jeddo	JDD.W	B		P	P	P	VP	P	VP	P	VP	P
washed phase		C,c		P	P	P	VP	P	VP	P	VP	P
			Drainage	+1	+1	+1	+2	+2	+2	+2	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-
Lincoln	LIC	B		U	U	U	VP	U	VP	VP	U	U
		C,c		U	U	U	VP	U	VP	VP	U	U
			Drainage	-	-	-	+1	-	+1	+1	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Lincoln	LIC.C	B		U	U	U	VP	U	VP	VP	VP	U
coarse phase		C,c		U	U	U	VP	U	VP	VP	VP	U
			Drainage	-	-	-	+1	-	+1	+1	+1	-
			Irrigation	-	-	-	-	-	-	-	-	-
Lincoln	LIC.L	B		U	U	U	VP	U	VP	VP	U	U
loamy phase		C,c		U	U	U	VP	U	VP	VP	U	U
			Drainage	-	-	-	+1	-	+1	+1	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Lincoln	LIC.P	B		U	U	U	U	U	U	U	U	U
peaty phase		C,c		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Lorraine	LRR	B		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Malton	MAT	B		U	U	U	VP	VP	VP	VP	VP	VP
		C,c		U	U	U	VP	VP	VP	VP	VP	VP
			Drainage	-	-	-	+2	+2	+2	+2	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Malton heavy phase	MAT.H	B		U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Malton heavy red phase	MAT.HR	B		U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Malton loamy red phase	MAT.LR	B		U	U	U	VP	P	VP	VP	VP	VP
		C,c		U	U	U	VP	P	VP	VP	VP	VP
			Drainage	-	-	-	+2	+2	+2	+2	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Malton red phase	MAT.R	B		U	U	U	VP	VP	VP	VP	VP	VP
		C,c		U	U	U	VP	VP	VP	VP	VP	VP
			Drainage	-	-	-	+2	+2	+2	+2	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Maplewood	MPW	B		U	U	U	VP	VP	P	P	VP	P
		C,c		U	U	U	VP	VP	P	P	VP	P
			Drainage	-	-	-	+2	+2	+2	+2	+3	+2
			Irrigation	-	-	-	-	-	-	-	-	-
Maplewood red phase	MPW.R	B		U	U	U	VP	VP	P	P	VP	P
		C,c		U	U	U	VP	VP	P	P	VP	P
			Drainage	-	-	-	+2	+2	+2	+2	+3	+2
			Irrigation	-	-	-	-	-	-	-	-	-
Maplewood till phase	MPW.T	B		U	U	U	VP	VP	P	P	VP	P
		C,c		U	U	U	VP	VP	P	P	VP	P
			Drainage	-	-	-	+2	+2	+2	+2	+3	+2
			Irrigation	-	-	-	-	-	-	-	-	-
Maplewood till red phase	MPW.TR	B		U	U	U	VP	VP	P	P	VP	P
		C,c		U	U	U	VP	VP	P	P	VP	P
			Drainage	-	-	-	+2	+2	+2	+2	+3	+2
			Irrigation	-	-	-	-	-	-	-	-	-
Marsh	MAR	B		NOT RATED								

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Morley	MOY	B		U	U	U	VP	VP	VP	VP	VP	P
		C,c		U	U	U	VP	VP	VP	VP	VP	P
			Drainage	-	-	-	+2	+2	+2	+2	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-
Morley shallow phase	MOY.S	B		U	U	U	VP	VP	VP	U	VP	P
		C,c		U	U	U	VP	VP	VP	U	VP	P
			Drainage	-	-	-	+2	+2	+1	-	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-
Niagara	NGR	B		U	U	U	P	VP	P	P-F	U	P
		C,c		U	U	U	P	VP	P	P-F	U	P
		D,d		U	U	U	P	VP	P	P-F	U	VP
			Drainage	-	-	-	+1	+1	+1	+1	-	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Niagara loamy phase	NGR.L	B		U	U	U	P	P	P	P-F	U	P
		C,c		U	U	U	P	P	P	P-F	U	P
		D,d		U	U	U	P	P	P	P-F	U	VP
			Drainage	-	-	-	+1	+1	+1	+1	-	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Not Mapped	NM			NOT RATED								
Oneida	OID	B		P-F	P-F	P-F	F-G	F	F-G	G	F	G
		C,c		P-F	P-F	P-F	F-G	F	F-G	G	F	G
		D,d		P	P-F	P	F	P-F	F-G	G	P-F	F-G
		E,e		P	P	U	F	P-F	F	F-G	P	F
		F,f		U	U	U	U	U	P-F	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Oneida loamy phase	OID.L	B		P-F	P-F	P-F	F-G	F	F-G	G	F	G
		C,c		P-F	P-F	P-F	F-G	F	F-G	G	F	G
		D,d		P	P-F	P	F	P-F	F-G	G	P-F	F-G
		E,e		P	P	U	F	P-F	F	F-G	P	F
		F,f		U	U	U	U	U	P-F	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Oneida loamy red phase	OID.LR	B		P-F	P-F	P-F	F-G	F	F-G	G	F	G
		C,c		P-F	P-F	P-F	F-G	F	F-G	G	F	G
		D,d		P	P-F	P	F	P-F	F-G	G	P-F	F-G
		E,e		P	P	U	F	P-F	F	F-G	P	F
		F,f		U	U	U	U	U	P-F	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Oneida red phase	OID.R	B		P-F	P-F	P-F	F-G	F	F-G	G	F	G
		C,c		P-F	P-F	P-F	F-G	F	F-G	G	F	G
		D,d		P	P-F	P	F	P-F	F-G	G	P-F	F-G
		E,e		P	P	U	F	P-F	F	F-G	P	F
		F,f		U	U	U	U	U	P-F	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Oneida red washed phase	OID.RW	B		F	F	F	F-G	F-G	F-G	G	F	G
		C,c		F	F	F	F-G	F-G	F-G	G	F	G
		D,d		P-F	F	P-F	F	F	F-G	G	P-F	F-G
		E,e		P-F	P-F	U	F	F	F	F-G	P	F
		F,f		P	U	U	U	U	P-F	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Oneida washed phase	OID.W	B		F	F	F	F-G	F-G	F-G	G	F	G
		C,c		F	F	F	F-G	F-G	F-G	G	F	G
		D,d		P-F	F	P-F	F	F	F-G	G	P-F	F-G
		E,e		P-F	P-F	U	F	F	F	F-G	P	F
		F,f		P	U	U	U	U	P-F	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Ontario	OTI	B		U	U	U	P-F	P	P-F	F	P	P-F
		C,c		U	U	U	P-F	P	P-F	F	P	P-F
		D,d		U	U	U	P	P	P-F	F	P	P
		E,e		U	U	U	P	P	P	P-F	P	P
		F,f		U	U	U	U	U	P	P	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Peel	PEL	B		VP	VP	VP	P-F	P-F	P-F	F	P	P-F
		C,c		VP	VP	VP	P-F	P-F	P-F	F	P	P-F
		D,d		U	U	U	P	P	P-F	F	VP	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Peel coarse phase	PEL.C	B		VP	VP	VP	P-F	F	P-F	F	P-F	P-F
		C,c		VP	VP	VP	P-F	F	P-F	F	P-F	P-F
		D,d		U	U	U	P	P-F	P-F	F	P	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Peel	PEL.H	B		U	U	U	VP	VP	P	P-F	VP	P
heavy phase		C,c		U	U	U	VP	VP	P	P-F	VP	P
		D,d		U	U	U	U	U	P	P-F	U	VP
			Drainage	-	-	-	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Peel	PEL.HR	B		U	U	U	VP	VP	P	P-F	VP	P
heavy red phase		C,c		U	U	U	VP	VP	P	P-F	VP	P
		D,d		U	U	U	U	U	P	P-F	U	VP
			Drainage	-	-	-	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Peel	PEL.L	B		VP	VP	VP	P-F	F	P-F	F	P	P-F
loamy phase		C,c		VP	VP	VP	P-F	F	P-F	F	P	P-F
		D,d		U	U	U	P	P-F	P-F	F	VP	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Peel	PEL.LR	B		VP	VP	VP	P-F	F	P-F	F	P	P-F
loamy red phase		C,c		VP	VP	VP	P-F	F	P-F	F	P	P-F
		D,d		U	U	U	P	P-F	P-F	F	VP	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Peel	PEL.R	B		VP	VP	VP	P-F	P-F	P-F	F	P	P-F
red phase		C,c		VP	VP	VP	P-F	P-F	P-F	F	P	P-F
		D,d		U	U	U	P	P	P-F	F	VP	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Plainfield	PFD	B		P-F	F	F	P-F	P-F	P-F	P-F	P-F	P
		C,c		P-F	F	F	P-F	P-F	P-F	P-F	P-F	P
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+1	+1	+1	+1	+2	+1	+1	+1	+1
Plainfield	PFD.D	D,d		P	F	P-F	P	P	P-F	P-F	P	P
dune phase		E,e		P	U	U	P	P	P	P	P	P
		F,f		U	U	U	U	U	P	P	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+1	+1	+1	+1	+2	+1	+1	+1	+1
Port Colborne	PCE	B		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Portsmouth	PUH	B		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

** **Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Quarry	QRY	B		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Ridgeville	RVE	B		F	F	F	P-F	P-F	P-F	P-F	P-F	P
		C,c		F	F	F	P-F	P-F	P-F	P-F	P-F	P
		D,d		P-F	F	P-F	P	P	P-F	P-F	P	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	-
			Irrigation	+1	+1	+1	-	+2	+1	+1	+1	-
Sherkston	SRK	B		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Silver Hill	SIH	B		VP	U	VP	VP	VP	P	P	VP	VP
		C,c		VP	U	VP	VP	VP	P	P	VP	VP
			Drainage	+1	-	+1	+2	+2	+2	+2	+3	+2
			Irrigation	+1	-	-	-	-	-	-	-	-
Smithville	SHV	B		U	U	U	P-F	P-F	P-F	F	P	P-F
		C,c		U	U	U	P-F	P-F	P-F	F	P	P-F
		D,d		U	U	U	P	P	P-F	F	P	P
		E,e		U	U	U	P	P	P	P-F	P	P
		F,f		U	U	U	U	U	P	P	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Smithville loamy phase	SHV.L	B		U	U	U	P-F	P-F	P-F	F	P	P-F
		C,c		U	U	U	P-F	P-F	P-F	F	P	P-F
		D,d		U	U	U	P	P	P-F	F	P	P
		E,e		U	U	U	P	P	P	P-F	P	P
		F,f		U	U	U	U	U	P	P	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Tavistock	TVK	B		P-F	P	P-F	F-G	F	F	F	F	F-G
		C,c		P-F	P	P-F	F-G	F	F	F	F	F-G
		D,d		P	VP	P	F	P-F	F	F	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	+1	-	-	-	-	-	-	+1	-
Tavistock heavy red phase	TVK.HR	B		P	VP	P	P-F	P	P-F	P-F	P-F	F
		C,c		P	VP	P	P-F	P	P-F	P-F	P-F	F
		D,d		VP	U	VP	P	U	P-F	P-F	P	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	+1	-	-	-	-	-	-	+1	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

** **Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Tavistock red phase	TVK.R	B		P-F	P	P-F	F-G	F	F	F	F	F-G
		C,c		P-F	P	P-F	F-G	F	F	F	F	F-G
		D,d		P	VP	P	F	P-F	F	F	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	+1	-	-	-	-	-	-	+1	-
Tavistock till phase	TVK.T	B		P-F	P	P-F	F-G	F	F	F	F	F-G
		C,c		P-F	P	P-F	F-G	F	F	F	F	F-G
		D,d		P	VP	P	F	P-F	F	F	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	+1	-	-	-	-	-	-	+1	-
Tavistock till red phase	TVK.TR	B		P-F	P	P-F	F-G	F	F	F	F	F-G
		C,c		P-F	P	P-F	F-G	F	F	F	F	F-G
		D,d		P	VP	P	F	P-F	F	F	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	+1	-	-	-	-	-	-	+1	-
Toledo	TLD	B		U	U	U	VP	VP	VP	VP	VP	VP
		C,c		U	U	U	VP	VP	VP	VP	VP	VP
			Drainage	-	-	-	+2	+2	+2	+2	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Toledo coarse phase	TLD.C	B		U	U	U	VP	P	VP	VP	P-F	VP
		C,c		U	U	U	VP	P	VP	VP	P-F	VP
			Drainage	-	-	-	+2	+2	+2	+2	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Toledo loamy phase	TLD.L	B		U	U	U	VP	P	VP	VP	VP	VP
		C,c		U	U	U	VP	P	VP	VP	VP	VP
			Drainage	-	-	-	+2	+2	+2	+2	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Toledo loamy red phase	TLD.LR	B		U	U	U	VP	P	VP	VP	VP	VP
		C,c		U	U	U	VP	P	VP	VP	VP	VP
			Drainage	-	-	-	+2	+2	+2	+2	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Toledo peaty phase	TLD.P	B		U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Toledo red phase	TLD.R	B		U	U	U	VP	VP	VP	VP	VP	VP
		C,c		U	U	U	VP	VP	VP	VP	VP	VP
			Drainage	-	-	-	+2	+2	+2	+2	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

** **Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Trafalgar	TFG	B		VP	VP	VP	F	P-F	P-F	P-F	P-F	F-G
		C,c		VP	VP	VP	F	P-F	P-F	P-F	P-F	F-G
		D,d		U	U	U	P-F	P	P-F	P-F	P	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Trafalgar loamy phase	TFG.L	B		VP	VP	VP	F	P-F	P-F	P-F	P-F	F-G
		C,c		VP	VP	VP	F	P-F	P-F	P-F	P-F	F-G
		D,d		U	U	U	P-F	P	P-F	P-F	P	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Trafalgar shallow phase	TFG.S	B		U	U	U	F	P-F	VP	U	P-F	F-G
		C,c		U	U	U	F	P-F	VP	U	P-F	F-G
		D,d		U	U	U	P-F	P	VP	U	P	F
			Drainage	-	-	-	+1	+1	+1	-	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-
Tuscola	TUC	B		F	P-F	F	F-G	F-G	F	F	F	F-G
		C,c		F	P-F	F	F-G	F-G	F	F	F	F-G
		D,d		P-F	P-F	P	F	F	F	F	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	+1	-	-	-	-	-	-	+1	-
Tuscola red phase	TUC.R	B		F	P-F	F	F-G	F-G	F	F	F	F-G
		C,c		F	P-F	F	F-G	F-G	F	F	F	F-G
		D,d		P-F	P-F	P	F	F	F	F	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	+1	-	-	-	-	-	-	+1	-
Vineland	VLD	B		F	P-F	F-G	F	F-G	F	P-F	F	P-F
		C,c		F	P-F	F-G	F	F-G	F	P-F	F	P-F
		D,d		P-F	P-F	F	P-F	F	F	P-F	P-F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	+1	-	-	-	-	+1	+1	+1	-
Vineland brown phase	VLD.B	B		F	P-F	F-G	F	F-G	F	P-F	F	P-F
		C,c		F	P-F	F-G	F	F-G	F	P-F	F	P-F
		D,d		P-F	P-F	F	P-F	F	F	P-F	P-F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	+1	-	-	-	-	+1	+1	+1	-
Vittoria	VIT	B		F	P-F	F	F	F-G	F	F	F	P-F
		C,c		F	P-F	F	F	F-G	F	F	F	P-F
		D,d		P-F	P-F	P	P-F	F	F	F	P-F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	+1	-	-	-	-	-	-	+1	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

** **Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 7. Agricultural land suitability ratings for tree fruits, grapes and small fruits in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9
Vittoria red phase	VIT.R	B		F	P-F	F	F	F-G	F	F	F	P-F
		C,c		F	P-F	F	F	F-G	F	F	F	P-F
		D,d		P-F	P-F	P	P-F	F	F	F	P-F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	+1	-	-	-	-	-	-	+1	-
Wainfleet	WAF	B		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Walsher	WSH	B		F-G	F	F-G	F-G	G	F-G	F-G	F-G	F
		C,c		F-G	F	F-G	F-G	G	F-G	F-G	F-G	F
		D,d		F	F	P-F	F	F-G	F-G	F-G	F	P-F
		E,e		F	P	U	F	F-G	F	F	P-F	P
		F,f		U	U	U	U	U	P-F	P-F	U	U
		G,g		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	+1	-	-	-	-	+1	-	+1	+1
Walsingham	WAM	B		P	P-F	P-F	P	P	P-F	P-F	P	P
		C,c		P	P-F	P-F	P	P	P-F	P-F	P	P
		D,d		P	P-F	P-F	VP	VP	P-F	P-F	VP	U
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	-
			Irrigation	+1	+1	+1	-	+2	+1	+1	+1	-
Wauseon	WUS	B		U	U	U	VP	VP	P	P	VP	VP
		C,c		U	U	U	VP	VP	P	P	VP	VP
			Drainage	-	-	-	+2	+2	+2	+2	+3	+2
			Irrigation	-	-	-	-	-	-	-	-	-
Welland	WLL	B		U	U	U	VP	U	VP	VP	U	U
		C,c		U	U	U	VP	U	VP	VP	U	U
			Drainage	-	-	-	+1	-	+1	+1	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Welland loamy phase	WLL.L	B		U	U	U	VP	U	VP	VP	U	U
		C,c		U	U	U	VP	U	VP	VP	U	U
			Drainage	-	-	-	+1	-	+1	+1	-	-
			Irrigation	-	-	-	-	-	-	-	-	-
Welland peaty phase	WLL.P	B		U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

** **Crop Groups**

1. *Peaches, apricots, nectarines*
2. *Sweet cherries*
3. *Sour cherries*
4. *Labrusca grapes*
5. *Vinifera grapes*
6. *Apples*
7. *Pears, plums*
8. *Strawberries, raspberries*
9. *Currants, gooseberries*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Alluvium 1	1-ALU	B		U	U	U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Alluvium 1 very shallow phase	1-ALU.V	B		U	U	U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U	U	U
		D,d		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Alluvium 2	2-ALU	B		U	U	U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Alluvium 3	3-ALU	B		U	U	U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Alluvium 4	4-ALU	B		U	U	U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Bennington	BNG	B		G	F	F-G	F-G	G	F-G	F	G	G	F-G	F-G
		C,c		F-G	P-F	F	F	G	F-G	F	F-G	F-G	F-G	F-G
		D,d		F-G	U	U	F	F-G	F	P-F	F-G	F-G	F	F
		E,e		F	U	U	P-F	F	P-F	P	F	F	P-F	P-F
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	+1	-	-	+1	-	-	+1	-
Bennington red phase	BNG.R	B		G	F	F-G	F-G	G	F-G	F	G	G	F-G	F-G
		C,c		F-G	P-F	F	F	G	F-G	F	F-G	F-G	F-G	F-G
		D,d		F-G	U	U	F	F-G	F	P-F	F-G	F-G	F	F
		E,e		F	U	U	P-F	F	P-F	P	F	F	P-F	P-F
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	+1	-	-	+1	-	-	+1	-
Berrien	BRR	B		F	F	F	F	F	F	P-F	F	F	F	F-G
		C,c		P-F	P-F	P-F	P-F	F	F	P-F	P-F	P-F	F	F-G
		D,d		P-F	U	U	P-F	P-F	P-F	P	P-F	P-F	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
4. *Eggplant, peppers*
5. *Cucumbers*
6. *Muskmelon*
7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Berrien red phase	BRR.R	B		F	F	F	F	F	F	P-F	F	F	F	F-G
		C,c		P-F	P-F	P-F	P-F	F	F	P-F	P-F	P-F	F	F-G
		D,d		P-F	U	U	P-F	P-F	P-F	P	P-F	P-F	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-
Berrien till phase	BRR.T	B		F	F	F	F	F	F	P-F	F	F	F	F-G
		C,c		P-F	P-F	P-F	P-F	F	F	P-F	P-F	P-F	F	F-G
		D,d		P-F	U	U	P-F	P-F	P-F	P	P-F	P-F	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-
Beverly	BVY	B		F	VP	VP	P-F	P-F	P	VP	F	P-F	P-F	P-F
		C,c		P-F	U	U	P	P-F	P	VP	P-F	P	P-F	P-F
		D,d		P-F	U	U	VP	P	VP	U	P-F	P	P	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Beverly coarse phase	BVY.C	B		F-G	P	P	F	F	P-F	P	F-G	F	F	F
		C,c		F	VP	VP	P-F	F	P-F	P	F	P-F	F	F
		D,d		F	VP	VP	P	P-F	P	VP	F	P-F	P-F	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Beverly loamy phase	BVY.L	B		F-G	P	VP	P-F	F	P-F	VP	F-G	F	F	P-F
		C,c		F	VP	U	P	F	P-F	VP	F	P-F	F	P-F
		D,d		F	VP	U	VP	P-F	P	U	F	P-F	P-F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Beverly loamy red phase	BVY.LR	B		F-G	P	VP	P-F	F	P-F	VP	F-G	F	F	P-F
		C,c		F	VP	U	P	F	P-F	VP	F	P-F	F	P-F
		D,d		F	VP	U	VP	P-F	P	U	F	P-F	P-F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Beverly red phase	BVY.R	B		F	VP	VP	P-F	P-F	P	VP	F	P-F	P-F	P-F
		C,c		P-F	U	U	P	P-F	P	VP	P-F	P	P-F	P-F
		D,d		P-F	U	U	VP	P	VP	U	P-F	P	P	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Bookton	BOO	B		F-G	F-G	F-G	F-G	F-G	F-G	F	F-G	F-G	F-G	G
		C,c		F	F	F	F	F-G	F-G	F	F	F	F-G	G
		D,d		F	U	U	F	F	F	P-F	F	F	F	F-G
		E,e		P-F	U	U	P-F	P-F	P-F	P	P-F	P-F	P-F	F
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	+1	+1	+1	+1	+1	-	+1	+1	-	+1	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
4. *Eggplant, peppers*
5. *Cucumbers*
6. *Muskmelon*
7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Bookton red phase	BOO.R	B		F-G	F-G	F-G	F-G	F-G	F-G	F	F-G	F-G	F-G	G
		C,c		F	F	F	F	F-G	F-G	F	F	F	F-G	G
		D,d		F	U	U	F	F	F	P-F	F	F	F	F-G
		E,e		P-F	U	U	P-F	P-F	P-F	P	P-F	P-F	P-F	F
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	+1	+1	+1	+1	+1	-	+1	+1	-	+1	-
Brady	BAY	B		P-F	F	F	F	F	F	F	P-F	P-F	F	P-F
		C,c		P-F	F	F	F	F	F	F	P-F	P-F	F	P-F
		D,d		P	U	U	P-F	P-F	P-F	P-F	P	P	P-F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	+1	+1	+1	-	+1	+1	-	-	+1	-
Brady red phase	BAY.R	B		P-F	F	F	F	F	F	F	P-F	P-F	F	P-F
		C,c		P-F	F	F	F	F	F	F	P-F	P-F	F	P-F
		D,d		P	U	U	P-F	P-F	P-F	P-F	P	P	P-F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	+1	+1	+1	-	+1	+1	-	-	+1	-
Brant	BRT	B		G	F-G	F-G	F-G	G	F-G	F	G	G	F-G	F-G
		C,c		F-G	F	F	F	G	F-G	F	F-G	F-G	F-G	F-G
		D,d		F-G	U	U	F	F-G	F	P-F	F-G	F-G	F	F
		E,e		F	U	U	P-F	F	P-F	P	F	F	P-F	P-F
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	+1	-	-	+1	-
Brant red phase	BRT.R	B		G	F-G	F-G	F-G	G	F-G	F	G	G	F-G	F-G
		C,c		F-G	F	F	F	G	F-G	F	F-G	F-G	F-G	F-G
		D,d		F-G	U	U	F	F-G	F	P-F	F-G	F-G	F	F
		E,e		F	U	U	P-F	F	P-F	P	F	F	P-F	P-F
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	+1	-	-	+1	-
Brantford	BFO	B		F-G	P	P	F	F	P-F	P	F-G	F	F	F
		C,c		F	U	VP	P-F	F	P-F	P	F	P-F	F	F
		D,d		F	U	U	P-F	P-F	P	U	F	P-F	P-F	P-F
		E,e		P-F	U	U	P	P	U	U	P-F	P	P	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

** **Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
4. *Eggplant, peppers*
5. *Cucumbers*
6. *Muskmelon*
7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Brantford loamy phase	BFO.L	B		G	P-F	P	F	F-G	F	P	G	F-G	F-G	F
		C,c		F-G	U	VP	P-F	F-G	F	P	F-G	F	F-G	F
		D,d		F-G	U	U	P-F	F	P-F	U	F-G	F	F	P-F
		E,e		F	U	U	P	P-F	U	U	F	P-F	P-F	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Brantford loamy red phase	BFO.LR	B		G	P-F	P	F	F-G	F	P	G	F-G	F-G	F
		C,c		F-G	U	VP	P-F	F-G	F	P	F-G	F	F-G	F
		D,d		F-G	U	U	P-F	F	P-F	U	F-G	F	F	P-F
		E,e		F	U	U	P	P-F	U	U	F	P-F	P-F	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Brantford red phase	BFO.R	B		F-G	P	P	F	F	P-F	P	F-G	F	F	F
		C,c		F	U	VP	P-F	F	P-F	P	F	P-F	F	F
		D,d		F	U	U	P-F	P-F	P	U	F	P-F	P-F	P-F
		E,e		P-F	U	U	P	P	U	U	P-F	P	P	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Brooke shallow phase	BOK.S	B		P	VP	VP	P	VP	VP	VP	P	P	P	P
		C,c		VP	U	U	VP	VP	VP	VP	VP	VP	P	P
			Drainage	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Brooke very shallow phase	BOK.V	B		P	U	U	U	U	U	U	P	P	P	U
		C,c		U	U	U	U	U	U	U	U	U	P	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Cashel	CSH	B		F-G	P	P	F	F	P-F	P	F-G	F	F	F
		C,c		F	U	VP	P-F	F	P-F	P	F	P-F	F	F
		D,d		F	U	U	P-F	P-F	P	U	F	P-F	P-F	P-F
		E,e		P-F	U	U	P	P	U	U	P-F	P	P	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
4. *Eggplant, peppers*
5. *Cucumbers*
6. *Muskmelon*
7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Cashel heavy red phase	CSH.HR	B		F	VP	VP	P-F	P-F	P	VP	F	P-F	P-F	P-F
		C,c		P-F	U	U	P	P-F	P	VP	P-F	P	P-F	P-F
		D,d		P-F	U	U	P	P	VP	U	P-F	P	P	P
		E,e		P	U	U	VP	VP	U	U	P	VP	VP	VP
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Cashel red phase	CSH.R	B		F-G	P	P	F	F	P-F	P	F-G	F	F	F
		C,c		F	U	VP	P-F	F	P-F	P	F	P-F	F	F
		D,d		F	U	U	P-F	P-F	P	U	F	P-F	P-F	P-F
		E,e		P-F	U	U	P	P	U	U	P-F	P	P	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Cashel washed phase	CSH.W	B		F-G	VP	VP	F	F-G	F	P-F	G	F-G	F	F-G
		C,c		F	U	U	P-F	F-G	F	P-F	F-G	F	F	F-G
		D,d		F	U	U	P-F	F	P-F	U	F-G	F	P-F	F
		E,e		P-F	U	U	P	P-F	U	U	F	P-F	P	P-F
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Chinguacousy	CGU	B		F	VP	VP	F	P-F	P	VP	F	P-F	P-F	P-F
		C,c		P-F	U	U	P-F	P-F	P	VP	P-F	P	P-F	P-F
		D,d		P-F	U	U	P-F	P	VP	U	P-F	P	P	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Chinguacousy coarse phase	CGU.C	B		F-G	P	P	F-G	F	P-F	P	F-G	F	F	F
		C,c		F	U	U	F	F	P-F	P	F	P-F	F	F
		D,d		F	U	U	F	P-F	P	U	F	P-F	P-F	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Chinguacousy loamy phase	CGU.L	B		F-G	P	VP	F	F	P-F	VP	F-G	F	F	P-F
		C,c		F	U	U	P-F	F	P-F	VP	F	P-F	F	P-F
		D,d		F	U	U	P-F	P-F	P	U	F	P-F	P-F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Chinguacousy loamy red phase	CGU.LR	B		F-G	P	VP	F	F	P-F	VP	F-G	F	F	P-F
		C,c		F	U	U	P-F	F	P-F	VP	F	P-F	F	P-F
		D,d		F	U	U	P-F	P-F	P	U	F	P-F	P-F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
4. *Eggplant, peppers*
5. *Cucumbers*
6. *Muskmelon*
7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Chinguacousy red phase	CGU.R	B		F	VP	VP	F	P-F	P	VP	F	P-F	P-F	P-F
		C,c		P-F	U	U	P-F	P-F	P	VP	P-F	P	P-F	P-F
		D,d		P-F	U	U	P-F	P	VP	U	P-F	P	P	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Chinguacousy red washed phase	CGU.RW	B		F	U	U	F	F	P-F	P	F-G	F	P-F	F
		C,c		P-F	U	U	P-F	F	P-F	P	F	P-F	P-F	F
		D,d		P-F	U	U	P-F	P-F	P	U	F	P-F	P	P-F
			Drainage	+1	-	-	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Chinguacousy washed phase	CGU.W	B		F	U	U	F	F	P-F	P	F-G	F	P-F	F
		C,c		P-F	U	U	P-F	F	P-F	P	F	P-F	P-F	F
		D,d		P-F	U	U	P-F	P-F	P	U	F	P-F	P	P-F
			Drainage	+1	-	-	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Colwood	CWO	B		P	P	P	P	P	VP	P	P	P	P	P
		C,c		VP	VP	VP	VP	VP	VP	P	VP	VP	P	P
			Drainage	+3	+2	+3	+2	+3	+2	+2	+3	+2	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Colwood red phase	CWO.R	B		P	P	P	P	P	VP	P	P	P	P	P
		C,c		VP	VP	VP	VP	VP	VP	P	VP	VP	P	P
			Drainage	+3	+2	+3	+2	+3	+2	+2	+3	+2	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Complex 1	CPX 1			NOT RATED										
Complex 7	CPX 7			NOT RATED										
Escarpment	ESC			NOT RATED										
Farmington	FRM	B		U	U	U	U	U	U	U	U	U	U	U
		C,c		U	U	U	U	U	U	U	U	U	U	U
		D,d		U	U	U	U	U	U	U	U	U	U	U
		E,e		U	U	U	U	U	U	U	U	U	U	U
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			irrigation	-	-	-	-	-	-	-	-	-	-	-
Farmington shallow phase	FRM.S	B		F-G	P-F	P-F	F	F	P-F	P-F	F-G	F-G	F	F
		C,c		F	P	P	P-F	F	P-F	P-F	F	F	F	F
		D,d		F	U	U	P-F	P-F	P	P	F	F	P-F	P-F
		E,e		P-F	U	U	P	P	U	U	P-F	P-F	P	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	+1	+1	-	-	-	+1	-	-	+1	-

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**** Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
4. *Eggplant, peppers*
5. *Cucumbers*
6. *Muskmelon*
7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Farmington very shallow phase	FRM.V	B		F	P	P	P-F	P-F	P	P	F	F	P-F	P-F
		C,c		P-F	U	VP	P	P-F	U	P	P-F	P-F	P-F	P-F
		D,d		P-F	U	U	P	P	U	U	P-F	P-F	P	P
		E,e		P	U	U	U	U	U	U	P	P	U	U
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	+1	+1	-	-	-	+1	-	-	+1	-
Flamborough	FMB	B		P	P	P	P	P	VP	P	P	P	P	P
		C,c		VP	VP	VP	VP	P	VP	P	VP	VP	P	P
			Drainage	+2	+2	+3	+3	+3	+3	+2	+2	+2	+2	+3
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Flamborough brown phase	FMB.B	B		P	P	P	P	P	VP	P	P	P	P	P
		C,c		VP	VP	VP	VP	P	VP	P	VP	VP	P	P
			Drainage	+2	+2	+3	+3	+3	+3	+2	+2	+2	+2	+3
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Fonthill	FNT	B		F	P	U	F	F	F-G	F	F	F	F	F
		C,c		F	P	U	F	F	F-G	F	F	F	F	F
		D,d		P-F	U	U	P-F	P-F	F	P-F	P-F	P-F	P-F	P-F
		E,e		P	U	U	P	P	P-F	P	P	P	P	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	+1	+1	-	+1	+1	+1	+1	+1	-	+1	-
Fox	FOX	B		F	F-G	F-G	F-G	F-G	F-G	F-G	F	F	F-G	F
		C,c		F	F-G	F-G	F-G	F-G	F-G	F-G	F	F	F-G	F
		D,d		P-F	U	U	F	F	F	F	P-F	P-F	F	P-F
		E,e		P	U	U	P-F	P-F	P-F	P-F	P	P	P-F	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	+1	+1	+1	+1	+1	+1	+1	+1	-	+1	-
Fox red phase	FOX.R	B		F	F-G	F-G	F-G	F-G	F-G	F-G	F	F	F-G	F
		C,c		F	F-G	F-G	F-G	F-G	F-G	F-G	F	F	F-G	F
		D,d		P-F	U	U	F	F	F	F	P-F	P-F	F	P-F
		E,e		P	U	U	P-F	P-F	P-F	P-F	P	P	P-F	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	+1	+1	+1	+1	+1	+1	+1	+1	-	+1	-
Franktown shallow phase	FKW.S	B		F	P	P	P-F	P-F	P	P	F	F	P-F	P-F
		C,c		P-F	VP	VP	P	P-F	P	P	P-F	P-F	P-F	P-F
		D,d		P-F	U	U	P	P	VP	VP	P-F	P-F	P	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
4. *Eggplant, peppers*
5. *Cucumbers*
6. *Muskmelon*
7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Franktown	FKW.V	B		P-F	U	U	P	P	U	U	P-F	P-F	P-F	P
very shallow phase		C,c		P	U	U	U	P	U	U	P	P	P-F	P
		D,d		P	U	U	U	U	U	U	P	P	P	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Granby	GNY	B		P	P	P	P	P	VP	P	P	P	P	P
		C,c		VP	P	P	P	P	VP	P	P	P	P	P
			Drainage	+2	+3	+3	+3	+2	+3	+3	+2	+2	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Granby	GNY.PR	B		P-F	P-F	P-F	VP	VP	U	P-F	VP	VP	P-F	VP
peaty red phase		C,c		P	P-F	P-F	VP	VP	U	P-F	VP	VP	P-F	VP
			Drainage	+2	+3	+3	+3	+2	-	+3	+2	+2	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Grimsby	GMY	B		F-G	F-G	F-G	F-G	G	G	F	F-G	F-G	F-G	G
		C,c		F	F	F	F	G	G	F	F	F	F-G	G
		D,d		F	U	U	F	F-G	F-G	P-F	F	F	F	F-G
		E,e		P-F	U	U	P-F	F	F	P	P-F	P-F	P-F	F
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	+1	+1	+1	+1	-	-	+1	+1	-	+1	-
Grimsby	GMY.B	B		F-G	F-G	F-G	F-G	G	G	F	F-G	F-G	F-G	G
brown phase		C,c		F	F	F	F	G	G	F	F	F	F-G	G
		D,d		F	U	U	F	F-G	F-G	P-F	F	F	F	F-G
		E,e		P-F	U	U	P-F	F	F	P	P-F	P-F	P-F	F
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	+1	+1	+1	+1	-	-	+1	+1	-	+1	-
Haldimand	HIM	B		P-F	U	U	U	P	U	U	P-F	P	P	U
		C,c		P	U	U	U	P	U	U	P	VP	P	U
		D,d		P	U	U	U	VP	U	U	P	VP	VP	U
			Drainage	+1	-	-	-	+1	-	-	+1	+1	+1	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Haldimand	HIM.C	B		F	U	U	U	P-F	U	U	F	P-F	P-F	U
coarse phase		C,c		P-F	U	U	U	P-F	U	U	P-F	P	P-F	U
		D,d		P-F	U	U	U	P	U	U	P-F	P	P	U
			Drainage	+1	-	-	-	+1	-	-	+1	+1	+1	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Haldimand	HIM.L	B		F	U	U	U	P-F	U	U	F	P-F	P-F	U
loamy phase		C,c		P-F	U	U	U	P-F	U	U	P-F	P	P-F	U
		D,d		P-F	U	U	U	P	U	U	P-F	P	P	U
			Drainage	+1	-	-	-	+1	-	-	+1	+1	+1	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-

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** **Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
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Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Holly	HOY	B		VP	VP	P	U	VP	U	VP	U	VP	P	VP
			Drainage	+4	+5	+3	-	+1	-	+4	-	+1	+4	+1
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Jeddo	JDD	B		P	VP	VP	P	VP	VP	VP	P	P	P	P
		C,c		VP	U	U	VP	VP	VP	VP	VP	VP	P	P
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Jeddo loamy phase	JDD.L	B		P-F	P	VP	P	P	P	VP	P-F	P-F	P-F	P
		C,c		P	U	U	VP	P	P	VP	P	P	P-F	P
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Jeddo loamy red phase	JDD.LR	B		P-F	P	VP	P	P	P	VP	P-F	P-F	P-F	P
		C,c		P	U	U	VP	P	P	VP	P	P	P-F	P
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Jeddo red phase	JDD.R	B		P	VP	VP	P	VP	VP	VP	P	P	P	P
		C,c		VP	U	U	VP	VP	VP	VP	VP	VP	P	P
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Jeddo red washed phase	JDD.RW	B		P	U	U	P	P	P	P	P-F	P-F	P	P-F
		C,c		VP	U	U	VP	P	P	P	P	P	P	P-F
			Drainage	+2	-	-	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Jeddo washed phase	JDD.W	B		P	U	U	P	P	P	P	P-F	P-F	P	P-F
		C,c		VP	U	U	VP	P	P	P	P	P	P	P-F
			Drainage	+2	-	-	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Lincoln	LIC	B		P	U	U	U	VP	U	U	VP	VP	VP	U
		C,c		VP	U	U	U	VP	U	U	VP	VP	VP	U
			Drainage	+2	-	-	-	+2	-	-	+2	+2	+2	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Lincoln coarse phase	LIC.C	B		P-F	U	U	U	P	U	U	P	P	P	U
		C,c		P	U	U	U	P	U	U	P	P	P	U
			Drainage	+2	-	-	-	+2	-	-	+2	+2	+2	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Lincoln loamy phase	LIC.L	B		P-F	U	U	U	P	U	U	P	P	P	U
		C,c		P	U	U	U	P	U	U	P	P	P	U
			Drainage	+2	-	-	-	+2	-	-	+2	+2	+2	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Lincoln peaty phase	LIC.P	B		P-F	U	U	U	U	U	U	U	U	P	U
		C,c		P	U	U	U	U	U	U	U	U	P	U
			Drainage	+2	-	-	-	-	-	-	-	-	+2	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
4. *Eggplant, peppers*
5. *Cucumbers*
6. *Muskmelon*
7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Lorraine	LRR	B		VP	VP	P	U	VP	U	VP	U	VP	P	VP
			Drainage	+4	+5	+3	-	+4	-	+4	-	+1	+4	+1
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Malton	MAT	B		P	VP	VP	P	VP	VP	VP	P	P	P	P
		C,c		VP	U	U	VP	VP	VP	VP	VP	VP	P	P
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Malton heavy phase	MAT.H	B		VP	U	U	VP	U	U	U	VP	VP	VP	VP
		C,c		U	U	U	U	U	U	U	U	U	VP	VP
			Drainage	+2	-	-	+2	-	-	-	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Malton heavy red phase	MAT.HR	B		VP	U	U	VP	U	U	U	VP	VP	VP	VP
		C,c		U	U	U	U	U	U	U	U	U	VP	VP
			Drainage	+2	-	-	+2	-	-	-	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Malton loamy red phase	MAT.LR	B		P-F	P	VP	P	P	P	VP	P-F	P-F	P-F	P
		C,c		P	U	U	VP	P	P	VP	P	P	P-F	P
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Malton red phase	MAT.R	B		P	VP	VP	P	VP	VP	VP	P	P	P	P
		C,c		VP	U	U	VP	VP	VP	VP	VP	VP	P	P
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Maplewood	MPW	B		P	P	P	P	P	VP	P	P	P	P	P
		C,c		VP	VP	VP	VP	P	VP	P	VP	VP	P	P
			Drainage	+3	+2	+3	+2	+2	+2	+2	+3	+3	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Maplewood red phase	MPW.R	B		P	P	P	P	P	VP	P	P	P	P	P
		C,c		VP	VP	VP	VP	P	VP	P	VP	VP	P	P
			Drainage	+3	+2	+3	+2	+2	+2	+2	+3	+3	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Maplewood till phase	MPW.T	B		P	P	P	P	P	VP	P	P	P	P	P
		C,c		VP	VP	VP	VP	P	VP	P	VP	VP	P	P
			Drainage	+3	+2	+3	+2	+2	+2	+2	+3	+3	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Maplewood till red phase	MPW.TR	B		P	P	P	P	P	VP	P	P	P	P	P
		C,c		VP	VP	VP	VP	P	VP	P	VP	VP	P	P
			Drainage	+3	+2	+3	+2	+2	+2	+2	+3	+3	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Marsh	MAR			NOT RATED										

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
4. *Eggplant, peppers*
5. *Cucumbers*
6. *Muskmelon*
7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Morley	MOY	B		P	VP	VP	P	VP	VP	VP	P	P	P	P
		C,c		VP	U	U	VP	VP	VP	VP	VP	VP	P	P
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Morley shallow phase	MOY.S	B		P	VP	VP	P	VP	VP	VP	P	P	P	P
		C,c		VP	U	U	VP	VP	VP	VP	VP	VP	P	P
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Niagara	NGR	B		P-F	U	U	U	P	U	U	P-F	P	P	U
		C,c		P	U	U	U	P	U	U	P	VP	P	U
		D,d		P	U	U	U	VP	U	U	P	VP	VP	U
			Drainage	+1	-	-	-	+1	-	-	+1	+1	+1	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Niagara loamy phase	NGR.L	B		F	U	U	U	P-F	U	U	F	P-F	P-F	U
		C,c		P-F	U	U	U	P-F	U	U	P-F	P	P-F	U
		D,d		P-F	U	U	U	P	U	U	P-F	P	P	U
			Drainage	+1	-	-	-	+1	-	-	+1	+1	+1	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Not Mapped	NM			NOT RATED										
Oneida	OID	B		F-G	P	P	F-G	F	P-F	P	F-G	F	F	F
		C,c		F	U	VP	F	F	P-F	P	F	P-F	F	F
		D,d		F	U	U	F	P-F	P	U	F	P-F	P-F	P-F
		E,e		P-F	U	U	P-F	P	U	U	P-F	P	P	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Oneida loamy phase	OID.L	B		G	P-F	P	F-G	F-G	F	P	G	F-G	F-G	F
		C,c		F-G	U	VP	F	F-G	F	P	F-G	F	F-G	F
		D,d		F-G	U	U	F	F	P-F	P	F-G	F	F	P-F
		E,e		F	U	U	P-F	P-F	U	U	F	P-F	P-F	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Oneida loamy red phase	OID.LR	B		G	P-F	P	F-G	F-G	F	P	G	F-G	F-G	F
		C,c		F-G	U	VP	F	F-G	F	P	F-G	F	F-G	F
		D,d		F-G	U	U	F	F	P-F	P	F-G	F	F	P-F
		E,e		F	U	U	P-F	P-F	U	U	F	P-F	P-F	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
4. *Eggplant, peppers*
5. *Cucumbers*
6. *Muskmelon*
7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Oneida red phase	OID.R	B		F-G	P	P	F-G	F	P-F	P	F-G	F	F	F
		C,c		F	U	VP	F	F	P-F	P	F	P-F	F	F
		D,d		F	U	U	F	P-F	P	U	F	P-F	P-F	P-F
		E,e		P-F	U	U	P-F	P	U	U	P-F	P	P	P
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Oneida red washed phase	OID.RW	B		F-G	VP	VP	F-G	F-G	F	P-F	G	F-G	F	F-G
		C,c		F	U	U	F	F-G	F	P-F	F-G	F	F	F-G
		D,d		F	U	U	F	F	P-F	U	F-G	F	P-F	F
		E,e		P-F	U	U	P-F	P-F	U	U	F	P-F	P	P-F
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Oneida washed phase	OID.W	B		F-G	VP	VP	F-G	F-G	F	P-F	G	F-G	F	F-G
		C,c		F	U	U	F	F-G	F	P-F	F-G	F	F	F-G
		D,d		F	U	U	F	F	P-F	U	F-G	F	P-F	F
		E,e		P-F	U	U	P-F	P-F	U	U	F	P-F	P	P-F
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Ontario	OTI	B		F	U	U	U	P-F	U	U	F	P-F	P-F	U
		C,c		P-F	U	U	U	P-F	U	U	P-F	P	P-F	U
		D,d		P-F	U	U	U	P	U	U	P-F	P	P	U
		E,e		P	U	U	U	U	U	U	P	U	U	U
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Peel	PEL	B		F	VP	VP	P-F	P-F	P	VP	F	P-F	P-F	P-F
		C,c		P-F	U	U	P	P-F	P	VP	P-F	P	P-F	P-F
		D,d		P-F	U	U	P	P	VP	U	P-F	P	P	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Peel coarse phase	PEL.C	B		F-G	P	P	F	F	P-F	P	F-G	F	F	F
		C,c		F	U	U	P-F	F	P-F	P	F	P-F	F	F
		D,d		F	U	U	P-F	P-F	P	U	F	P-F	P-F	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
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5. *Cucumbers*
6. *Muskmelon*
7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Peel heavy phase	PEL.H	B		P-F	U	U	P	P	VP	U	P-F	P	P	P
		C,c		P	U	U	VP	P	VP	U	P	VP	P	P
		D,d		P	U	U	VP	VP	U	U	P	VP	VP	VP
			Drainage	+1	-	-	+1	+1	+1	-	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Peel heavy red phase	PEL.HR	B		P-F	U	U	P	P	VP	U	P-F	P	P	P
		C,c		P	U	U	VP	P	VP	U	P	VP	P	P
		D,d		P	U	U	VP	VP	U	U	P	VP	VP	VP
			Drainage	+1	-	-	+1	+1	+1	-	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Peel loamy phase	PEL.L	B		F-G	P	VP	P-F	F	P-F	VP	F-G	F	F	P-F
		C,c		F	U	U	P	F	P-F	VP	F	P-F	F	P-F
		D,d		F	U	U	P	P-F	P	U	F	P-F	P-F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Peel loamy red phase	PEL.LR	B		F-G	P	VP	P-F	F	P-F	VP	F-G	F	F	P-F
		C,c		F	U	U	P	F	P-F	VP	F	P-F	F	P-F
		D,d		F	U	U	P	P-F	P	U	F	P-F	P-F	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Peel red phase	PEL.R	B		F	VP	VP	P-F	P-F	P	VP	F	P-F	P-F	P-F
		C,c		P-F	U	U	P	P-F	P	VP	P-F	P	P-F	P-F
		D,d		P-F	U	U	P	P	VP	U	P-F	P	P	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Plainfield	PFD	B		P-F	F	F	P-F	P-F	F	P-F	P-F	P-F	P-F	P-F
		C,c		P-F	F	F	P-F	P-F	F	P-F	P-F	P-F	P-F	P-F
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	+1	+1	+1	+1	+1	+1	+1	+1	-	+1	-
Plainfield dune phase	PFD.D	D,d		P	U	U	P	P	P-F	P	P	P	P	P
		E,e		U	U	U	U	U	P	U	U	U	U	U
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	+1	-	-	+1	+1	+1	+1	+1	-	+1	-
Port Colborne	PCE	B		VP	VP	P	U	VP	U	VP	U	VP	P	VP
			Drainage	+4	+5	+3	-	+1	-	+4	-	+1	+4	+1
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Portsmouth	PUH	B		VP	VP	P	U	VP	U	VP	U	VP	P	VP
			Drainage	+4	+5	+3	-	+1	-	+4	-	+1	+4	+1
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (--) is shown.*

**** Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
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9. *Sweet corn*
10. *Celery, lettuce*
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Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Quarry	QRY	B		VP	VP	P	U	VP	U	VP	U	VP	P	VP
			Drainage	+4	+5	+3	-	+1	-	+4	-	+1	+4	+1
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Ridgeville	RVE	B		P-F	VP	U	F	P-F	F	P-F	P-F	P-F	P-F	P-F
		C,c		P-F	VP	U	F	P-F	F	P-F	P-F	P-F	P-F	P-F
		D,d		P	U	U	P-F	P	P-F	P	P	P	P	P
			Drainage	+1	+1	-	-	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	+1	-	+1	-	+1	+1	-	-	+1	-
Sherkston	SRK	B		VP	VP	P	U	VP	U	VP	U	VP	P	VP
			Drainage	+4	+5	+3	-	+1	-	+4	-	+1	+4	+1
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Silver Hill	SIH	B		P	P	P	P	P	VP	P	P	P	VP	P
		C,c		VP	VP	VP	VP	P	VP	P	VP	VP	VP	P
			Drainage	+2	+2	+3	+3	+2	+3	+2	+2	+2	+2	+2
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Smithville	SHV	B		F	U	U	U	P-F	U	U	F	P-F	P-F	U
		C,c		P-F	U	U	U	P-F	U	U	P-F	P	P-F	U
		D,d		P-F	U	U	U	P	U	U	P-F	P	P	U
		E,e		P	U	U	U	U	U	U	P	U	U	U
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Smithville loamy phase	SHV.L	B		F-G	U	U	U	F	U	U	F-G	F	F	U
		C,c		F	U	U	U	F	U	U	F	P-F	F	U
		D,d		F	U	U	U	P-F	U	U	F	P-F	P-F	U
		E,e		P-F	U	U	U	U	U	U	P-F	U	U	U
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Tavistock	TVK	B		F-G	P-F	F	F	F-G	F	P-F	F-G	F-G	F	F
		C,c		F	P	P-F	P-F	F-G	F	P-F	F	F	F	F
		D,d		F	U	U	P-F	F	P-F	P	F	F	P-F	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-
Tavistock heavy red phase	TVK.HR	B		F	P	P-F	P-F	F	P-F	P	F	F	P-F	P-F
		C,c		P-F	VP	P	P	F	P-F	P	P-F	P-F	P-F	P-F
		D,d		P-F	U	U	P	P-F	P	VP	P-F	P-F	P	P
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
4. *Eggplant, peppers*
5. *Cucumbers*
6. *Muskmelon*
7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Tavistock red phase	TVK.R	B		F-G	P-F	F	F	F-G	F	P-F	F-G	F-G	F	F
		C,c		F	P	P-F	P-F	F-G	F	P-F	F	F	F	F
		D,d		F	U	U	P-F	F	P-F	P	F	F	P-F	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-
Tavistock till phase	TVK.T	B		F-G	P-F	F	F	F-G	F	P-F	F-G	F-G	F	F
		C,c		F	P	P-F	P-F	F-G	F	P-F	F	F	F	F
		D,d		F	U	U	P-F	F	P-F	P	F	F	P-F	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-
Tavistock till red phase	TVK.TR	B		F-G	P-F	F	F	F-G	F	P-F	F-G	F-G	F	F
		C,c		F	P	P-F	P-F	F-G	F	P-F	F	F	F	F
		D,d		F	U	U	P-F	F	P-F	P	F	F	P-F	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-
Toledo	TLD	B		P	VP	VP	P	VP	VP	VP	P	P	P	P
		C,c		VP	U	U	VP	VP	VP	VP	VP	VP	P	P
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Toledo coarse phase	TLD.C	B		P-F	P	P	P-F	P	P	P	P-F	P-F	P-F	P-F
		C,c		P	U	U	P	P	P	P	P	P	P-F	P-F
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Toledo loamy phase	TLD.L	B		P-F	P	VP	P	P	P	VP	P-F	P-F	P-F	P
		C,c		P	U	U	VP	P	P	VP	P	P	P-F	P
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Toledo loamy red phase	TLD.LR	B		P-F	P	VP	P	P	P	VP	P-F	P-F	P-F	P
		C,c		P	U	U	VP	P	P	VP	P	P	P-F	P
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Toledo peaty phase	TLD.P	B		P-F	P	P	VP	U	U	P	VP	VP	P-F	VP
		C,c		P	U	U	U	U	U	P	U	U	P-F	VP
			Drainage	+2	+1	+1	+2	-	-	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Toledo red phase	TLD.R	B		P	VP	VP	P	VP	VP	VP	P	P	P	P
		C,c		VP	U	U	VP	VP	VP	VP	VP	VP	P	P
			Drainage	+2	+1	+1	+2	+2	+1	+1	+2	+2	+2	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

** **Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
4. *Eggplant, peppers*
5. *Cucumbers*
6. *Muskmelon*
7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Trafalgar	TFG	B		F	VP	VP	P-F	P-F	P	VP	F	P-F	P-F	P-F
		C,c		P-F	U	U	P	P-F	P	VP	P-F	P	P-F	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Trafalgar loamy phase	TFG.L	B		F-G	P	VP	P-F	F	P-F	VP	F-G	F	F	P-F
		C,c		F	U	U	P	F	P-F	VP	F	P-F	F	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Trafalgar shallow phase	TFG.S	B		F	VP	VP	P-F	P-F	P	VP	F	P-F	P-F	P-F
		C,c		P-F	U	U	P	P-F	P	VP	P-F	P	P-F	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Tuscola	TUC	B		F-G	F	F	F	F-G	F	P-F	F-G	F-G	F	F
		C,c		F	P-F	P-F	P-F	F-G	F	P-F	F	F	F	F
		D,d		F	U	U	P-F	F	P-F	P	F	F	P-F	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-
Tuscola red phase	TUC.R	B		F-G	F	F	F	F-G	F	P-F	F-G	F-G	F	F
		C,c		F	P-F	P-F	P-F	F-G	F	P-F	F	F	F	F
		D,d		F	U	U	P-F	F	P-F	P	F	F	P-F	P-F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-
Vineland	VLD	B		F	F	F	F	F-G	F-G	P-F	F	F	F	F-G
		C,c		P-F	P-F	P-F	P-F	F-G	F-G	P-F	P-F	P-F	F	F-G
		D,d		P-F	U	U	P	F	F	P	P-F	P-F	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-
Vineland brown phase	VLD.B	B		F	F	F	F	F-G	F-G	P-F	F	F	F	F-G
		C,c		P-F	P-F	P-F	P-F	F-G	F-G	P-F	P-F	P-F	F	F-G
		D,d		P-F	U	U	P	F	F	P	P-F	P-F	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-
Vittoria	VIT	B		F	F	F	F	F	F-G	F	F	F	F	F-G
		C,c		P-F	P-F	P-F	P-F	F	F-G	F	P-F	P-F	F	F-G
		D,d		P-F	U	U	P-F	P-F	F	P-F	P-F	P-F	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-
Vittoria red phase	VIT.R	B		F	F	F	F	F	F-G	F	F	F	F	F-G
		C,c		P-F	P-F	P-F	P-F	F	F-G	F	P-F	P-F	F	F-G
		D,d		P-F	U	U	P-F	P-F	F	P-F	P-F	P-F	P-F	F
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	-	+1	-	-	-	+1	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

1. *Broccoli, brussels sprouts, cauliflower*
2. *Bulb onions, garlic*
3. *Green (bunching) onions*
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7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
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Table 8. Agricultural land suitability ratings for vegetable crops in the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	Slope classes	Management factors *	Crop Groups ** 1	2	3	4	5	6	7	8	9	10	11
Wainfleet	WAF	B		VP	VP	P	U	VP	U	VP	U	VP	P	VP
			Drainage	+4	+5	+3	-	+1	-	+4	-	+1	+4	+1
			Irrigation	-	-	+1	-	-	-	-	-	-	-	-
Walsher	WSH	B		F-G	F-G	F-G	F-G	F-G	G	F-G	F-G	F-G	F-G	G
		C,c		F	F	F	F	F-G	G	F-G	F	F	F-G	G
		D,d		F	U	U	F	F	F-G	F	F	F	F	F-G
		E,e		P-F	U	U	P-F	P-F	F	P-F	P-F	P-F	P-F	F
		F,f		U	U	U	U	U	U	U	U	U	U	U
		G,g		U	U	U	U	U	U	U	U	U	U	U
			Drainage	-	-	-	-	-	-	-	-	-	-	-
			Irrigation	+1	+1	+1	+1	+1	-	+1	+1	-	+1	-
Walsingham	WAM	B		P	P-F	P-F	P	P	P-F	P	P	P	P	P
		C,c		P	P-F	P-F	P	P	P-F	P	P	P	P	P
		D,d		VP	U	U	VP	VP	P	U	VP	VP	VP	VP
			Drainage	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
			Irrigation	-	+1	+1	+1	-	+1	+1	-	-	+1	-
Wauseon	WUS	B		P	P	P	P	P	VP	P	P	P	P	P
		C,c		VP	VP	VP	VP	P	VP	P	VP	VP	P	P
			Drainage	+2	+2	+3	+3	+2	+2	+2	+2	+2	+2	+3
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Welland	WLL	B		P	U	U	U	VP	U	U	VP	VP	VP	U
		C,c		VP	U	U	U	VP	U	U	VP	VP	VP	U
			Drainage	+2	-	-	-	+2	-	-	+2	+2	+2	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Welland loamy phase	WLL.L	B		P-F	U	U	U	P	U	U	P	P	P	U
		C,c		P	U	U	U	P	U	U	P	P	P	U
			Drainage	+2	-	-	-	+2	-	-	+2	+2	+2	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-
Welland peaty phase	WLL.P	B		P-F	U	U	U	U	U	U	U	U	P	U
		C,c		P	U	U	U	U	U	U	U	U	P	U
			Drainage	+2	-	-	-	-	-	-	-	-	+2	-
			Irrigation	-	-	-	-	-	-	-	-	-	-	-

**A significant improvement in the ratings as a result of the management factors is indicated by +1, +2, etc. Where the management factors would not be expected to affect the ratings, a dash (-) is shown.*

**** Crop Groups**

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7. *Potatoes*
8. *Tomatoes*
9. *Sweet corn*
10. *Celery, lettuce*
11. *Pumpkins, squash*

C. SOIL EROSION INTERPRETATIONS

I. J. Shelton and G. J. Wall, Agriculture Canada,
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(1) Soil Interpretations for Water Erosion

Soil erosion, by water, is a naturally occurring process that can be greatly accelerated by man's activity. Any practice that accelerates soil runoff, or reduces the natural protection afforded by vegetative cover, will generally lead to increasing erosion levels. Uncontrolled soil erosion can reduce production potential, deplete nutrients, and degrade soil tilth. Once removed from the land by water erosion, sediment, fertilizers and pesticides can adversely affect downstream water quality.

A widely accepted water erosion relationship, A = RKLSCP, used to predict average annual soil loss through sheet and rill erosion, is called the Universal Soil Loss Equation (U.S.L.E.) (19) where:

A is the average annual soil loss;
R is the rainfall erosivity factor;
K is the soil erodibility factor;
L is the slope length factor;
S is the slope gradient factor;
C is the crop cover factor;
P is the management practice factor.

The average annual soil loss, "A", is calculated in imperial units (tons/acre/year). To convert to metric units (tonnes/hectare/year) multiply the imperial unit value by 2.24.

Included in this report is information on the factors of the U.S.L.E. relevant to the Niagara Region. For more detailed information on the factors and background information on the methodology refer to Shelton and Wall (20). The "R" value for the Region is 75 (21). Soil erodibility (K) means and ranges and associated soil erosion potential classes, for each soil type, are reported in Table 9. LS values for individual slopes, and for representative map unit slope lengths and gradient combinations, are included in Tables 10 and 11, respectively. A quick reference table for determining potential soil losses for given K and LS combinations, in the Niagara Region, is provided in Table 12. Crop cover factors (C), for the variety of crops and rotations found in the Regional Municipality of Niagara are found in Table 13 and Table 14, and management practice factor values (P) are found in Table 15. The guidelines used to assess soil erosion potential classes are included in Table 16. Information from these tables can be used to make site specific, or map unit assessments of soil water erosion potential.

(2) How to Determine Potential Erosion from the Soil Map

The relative erosion potential for each soil map unit can be determined from the rainfall, soil erodibility and slope relationships of the U.S.L.E. described above. These interpretations reflect the scale of the soil map and are appropriate for general information and planning purposes in much the same way as the C.L.I. capability classes are used. Examples of how the interpretations are made are given below:

Method 1

Table 12 can be used to determine the average annual soil loss (RKLS) assuming bare field conditions. Note that this table has been compiled specifically for the Niagara Region, using R = 75 and representative slope lengths for each slope class appropriate for Niagara landscapes. This table is, therefore, not appropriate to use for areas other than the Niagara Region.

1. Take any map unit designation from a Niagara Region soil map.

e.g. $\frac{\text{BFO 6}}{\text{d} > \text{B}}$

Brantford (BFO) and Beverly (BVY) soils are the components of this map unit, as indicated by the legend on the soil map. This map unit contains approximately 70 percent of BFO soils and 30 percent of BVY soils.

2. To determine the average annual soil loss, first find the soil map unit component in Table 9. Note the "mean K-value" for each soil in the fourth column of Table 9 (Brantford = 0.26; Beverly = 0.28).

3. Each soil map unit component is associated with a slope class shown in the denominator of the map unit designation. In this example, d slopes are associated with the dominant Brantford map unit component, and B slopes are associated with the Beverly component.

4. Locate the point on Table 12 where the appropriate K-value row and slope column intersect. The value at this intersection is the potential soil loss for the soil map unit component.

e.g. Soil loss for the Brantford soil (k = 0.26; d slope) is 46.7 t/ha/y.

Soil loss for the Beverly soil (k =0.28; B slope) is 11.3 t/ha/y.

These results only give an estimate of the erosion potential from bare fields, for the predominant landscape and soil conditions for each map unit, and should not be used as absolute soil loss amounts for the unit. However, this example does indicate that map unit component one has a higher potential for erosion than map unit component two, mainly resulting from steeper slopes of component one.

Note that this example does not account for any vegetation or conservation practices (C and P factors). To include these factors, multiply the RKLS by the appropriate C and P values (from Tables 13, 14 and 15, respectively) to obtain soil loss values.

Method 2

Soil loss potential for K-values not included in Table 12 (i.e. odd number values) can be estimated from Table 12, or by using the Universal Soil Loss Equation to calculate soil loss. An example of the latter is as follows:

1. Take any map unit designation from any Niagara soil map.

e.g. $\frac{\text{BRR 1}}{\text{c}}$

This designation represents a Berrien soil on a c slope.

2. Select the appropriate R, K, LS, C and P values for this unit.

R-value for Niagara Region = 75
Berrien K-value = 0.31 (Table 9)
c slope LS-value = 0.49 (Table 11)
Crop/vegetation cover — fall plowed silage corn (previous year corn)
C-value = 0.62 (Table 13)
Conservation Practices — none
P-value = 1.0 (Table 15)

3. Using the Universal Soil Loss Equation, calculate the average annual soil loss (A) by water:

A = RKLSCP using the U.S.L.E.
= 75 x 0.31 x 0.49 x 0.42 x 1.0
= 4.78 t/ac/y x 2.24
= 10.72 t/ha/y

(3) How to Determine Potential Erosion from Field Sites

Site or field-specific interpretations are utilized for on-farm management purposes, by providing farm managers or extension personnel with a general indication of the erosion-reducing effectiveness of various crop and management systems. In order to estimate the annual soil loss for a field, follow the procedure outlined below.

1. Determine the site conditions and associated U.S.L.E. factor values for the field.

e.g. R-value for Niagara Region = 75
Soil type — BNG (Bennington)
(K= 0.48; Table 9)
Slope length — 200 metres
Slope gradient — 5 percent
(LS = 1.37; Table 10)
Crop/vegetation — fall plowed silage corn, following a corn crop
(C = 0.62; Table 13)
Conservation practices — rows planted across the slope
(P = 0.75; Table 15)

2. Calculate the average annual soil loss (A).

A = RKLSCP
= 75 x 0.48 x 1.72 x 0.62 x 0.75
= 28.8 t/ac/y (64.5 t/ha/y)
= Very severe (Soil Erosion Potential Class 5; Table 16)

3. A tolerable "A" value for deep agricultural soils is 11 t/ha/y (4.9 t/ac/y) or less. To determine which cropping practices would reduce the average annual soil loss to a more acceptable rate (i.e. less than 11 t/ha/y), rearrange the equation to solve for the crop cover factor (C).

C = A/RKLSP (where RKLSP = 28.8)
= 4.9/28.8
= 0.17 or less

To reduce soil losses on this field to a more acceptable level, using a change in cropping practices, a farm operator would have to choose a crop or crop rotation with an average annual C-value of 0.17 or less. In this case, winter wheat after spring grain (C-value 0.17; Table 13), forage crop (C-value 0.02; Table 13), or a rotation including a forage crop (Table 14) would be appropriate alternatives.

(4) Assumptions

1. The amount and monthly distribution of rainfall is assumed to be relatively constant throughout the Regional Municipality of Niagara.

2. Representative slope lengths for each slope class were used to calculate the LS values appropriate for Niagara landscapes.

3. Average levels of management are assumed. These would include good soil management practices that are feasible and practical under a largely mechanized system of agriculture.

4. The average annual soil losses calculated for each map unit are based on representative rainfall, soil, slope and possibly crop and management conditions. The results give a general indication of the erosion potential of a map unit, relative to other units. Since variations in conditions do occur within map units, estimations for specific sites require detailed information collected on the site, and a separate calculation for each unique combination of conditions.

Additional information on erosion by water can be obtained from Factsheets published by the Ontario Ministry of Agriculture and Food.

Table 9. K-values, K-ranges and erodibility classes for surface soils of the Regional Municipality of Niagara

Soil map unit component	Map symbol	No. of sites	Mean K-values	K-ranges	Soil erosion potential classes
Alluvium 1	1-ALU	4	0.24	0.21-0.32	2-4
Alluvium 1 very shallow phase	1-ALU.V	0	0.24	0.21-0.32	2-4
Alluvium 2	2-ALU	2	0.27	0.27-0.27	2-5
Alluvium 3	3-ALU	7	0.32	0.26-0.39	3-5
Alluvium 4	4-ALU	7	0.18	0.16-0.21	2-4
Bennington	BNG	4	0.48	0.39-0.59	3-5
Bennington red phase	BNG.R	1	0.43	0.43-0.43	3-5
Berrien	BRR	11	0.31	0.24-0.45	3-5
Berrien red phase	BRR.R	4	0.22	0.13-0.34	2-5
Berrien till phase	BRR.T	12	0.23	0.16-0.29	2-5
Beverly	BVY	89	0.28	0.18-0.46	3-5
Beverly coarse phase	BVY.C	1	0.28	0.28-0.28	3-5
Beverly loamy phase	BVY.L	74	0.35	0.25-0.51	3-5
Beverly loamy red phase	BVY.LR	15	0.36	0.29-0.42	3-5
Beverly red phase	BVY.R	19	0.24	0.18-0.42	2-5
Bookton	BOO	1	0.31	0.31-0.31	3-5
Bookton red phase	BOO.R	3	0.34	0.32-0.35	3-5
Brady	BAY	3	0.10	0.02-0.23	1-4
Brady red phase	BAY.R	2	0.20	0.09-0.31	2-5
Brant	BRT	4	0.46	0.28-0.66	3-5
Brant red phase	BRT.R	15	0.49	0.32-0.63	3-5
Brantford	BFO	18	0.26	0.17-0.38	2-5
Brantford loamy phase	BFO.L	11	0.33	0.25-0.40	3-5
Brantford loamy red phase	BFO.LR	0	0.33	0.25-0.40	3-5
Brantford red phase	BFO.R	4	0.26	0.21-0.30	2-5
Brooke shallow phase	BOK.S	9	0.25	0.18-0.33	2-4
Brooke very shallow phase	BOK.V	10	0.25	0.19-0.34	2-4
Cashel	CSH	3	0.34	0.27-0.42	3-5
Cashel heavy red phase	CSH.HR	0	0.34	0.27-0.42	3-5
Cashel red phase	CSH.R	1	0.24	0.24-0.24	3-5
Cashel washed phase	CSH.W	0	0.20	0.20-0.20	3-5
Chinguacousy	CGU	23	0.28	0.21-0.35	3-5
Chinguacousy coarse phase	CGU.C	2	0.28	0.27-0.29	3-5
Chinguacousy loamy phase	CGU.L	23	0.33	0.27-0.42	3-5
Chinguacousy loamy red phase	CGU.LR	12	0.31	0.25-0.43	3-5
Chinguacousy red phase	CGU.R	9	0.25	0.21-0.38	2-5
Chinguacousy red washed phase	CGU.RW	21	0.31	0.20-0.41	3-5
Chinguacousy washed phase	CGU.W	21	0.34	0.25-0.46	3-5
Colwood	CWO	16	0.36	0.27-0.49	3-5
Colwood red phase	CWO.R	6	0.40	0.37-0.44	3-5
Complex 1	CPX1			Not Rated	
Complex 7	CPX7			Not Rated	
Escarpment	ESC			Not Rated	
Farmington	FRM	4	0.30	0.21-0.43	3-5
Farmington shallow phase	FRM.S	4	0.29	0.26-0.32	3-5
Farmington very shallow phase	FRM.V	11	0.32	0.21-0.50	3-5
Flamborough	FMB	2	0.39	0.34-0.43	3-5
Flamborough brown phase	FMB.B	1	0.59	0.59-0.59	4-5
Fonthill	FNT	26	0.23	0.06-0.35	2-5
Fox	FOX	3	0.17	0.03-0.32	2-5
Fox red phase	FOX.R	5	0.13	0.10-0.17	2-5
Franktown shallow phase	FKW.S	13	0.29	0.22-0.40	3-5
Franktown very shallow phase	FKW.V	11	0.28	0.20-0.34	3-5
Granby	GNY	1	0.16	0.16-0.16	2-3

Table 9. K-values, K-ranges and erodibility classes for surface soils of the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	No. of sites	Mean K-values	K-ranges	Soil erosion potential classes
Granby peaty red phase	GNY.PR			Not Rated	
Grimsby	GMY	25	0.39	0.11-0.65	3-5
Grimsby brown phase	GMY.B	3	0.43	0.39-0.47	3-5
Haldimand	HIM	106	0.20	0.10-0.32	2-5
Haldimand coarse phase	HIM.C	0	0.28	0.28-0.28	3-5
Haldimand loamy phase	HIM.L	51	0.28	0.23-0.36	3-5
Holly	HOY			Not Rated	
Jeddo	JDD	17	0.25	0.19-0.33	2-5
Jeddo loamy phase	JDD.L	21	0.30	0.22-0.54	3-5
Jeddo loamy red phase	JDD.LR	6	0.30	0.24-0.36	3-5
Jeddo red phase	JDD.R	6	0.23	0.18-0.26	2-4
Jeddo red washed phase	JDD.RW	8	0.28	0.22-0.39	3-5
Jeddo washed phase	JDD.W	12	0.31	0.25-0.36	3-5
Lincoln	LIC	178	0.18	0.07-0.29	2-4
Lincoln coarse phase	LIC.C	0	0.30	0.29-0.32	3-5
Lincoln loamy phase	LIC.L	54	0.27	0.14-0.39	2-5
Lincoln peaty phase	LIC.P			Not Rated	
Lorraine	LRR			Not Rated	
Malton	MAT	16	0.23	0.16-0.32	2-4
Malton heavy phase	MAT.H	0	0.23	0.16-0.32	2-4
Malton heavy red phase	MAT.HR	0	0.23	0.16-0.32	2-4
Malton loamy red phase	MAT.LR	1	0.30	0.30-0.30	3-5
Malton red phase	MAT.R	10	0.24	0.17-0.35	2-4
Maplewood	MPW	24	0.36	0.23-0.43	3-5
Maplewood red phase	MPW.R	5	0.34	0.30-0.38	3-5
Maplewood till phase	MPW.T	5	0.30	0.24-0.40	3-5
Maplewood till red phase	MPW.TR	2	0.30	0.28-0.31	3-5
Marsh	MAR			Not Rated	
Morley	MOY	10	0.21	0.11-0.32	2-4
Morley shallow phase	MOY.S	4	0.26	0.21-0.28	2-5
Niagara	NGR	19	0.23	0.18-0.30	2-5
Niagara loamy phase	NGR.L	13	0.28	0.23-0.38	3-5
Not Mapped	NM			Not Rated	
Oneida	OID	6	0.29	0.25-0.35	3-5
Oneida loamy phase	OID.L	6	0.36	0.30-0.41	3-5
Oneida loamy red phase	OID.LR	2	0.28	0.24-0.32	3-5
Oneida red phase	OID.R	0	0.29	0.25-0.35	3-5
Oneida red washed phase	OID.RW	4	0.30	0.23-0.34	3-5
Oneida washed phase	OID.W	10	0.34	0.26-0.42	3-5
Ontario	OTI	6	0.22	0.16-0.32	2-5
Peel	PEL	4	0.29	0.22-0.34	3-5
Peel coarse phase	PEL.C	0	0.28	0.28-0.28	3-5
Peel heavy phase	PEL.H	0	0.29	0.22-0.34	3-5
Peel heavy red phase	PEL.HR	0	0.29	0.22-0.34	3-5
Peel loamy phase	PEL.L	6	0.31	0.23-0.38	3-5
Peel loamy red phase	PEL.LR	2	0.28	0.27-0.28	3-5
Peel red phase	PEL.R	2	0.20	0.19-0.21	2-5
Plainfield	PFD	2	0.12	0.03-0.22	1-3
Plainfield dune phase	PFD.D	0	0.12	0.03-0.22	5
Port Colborne	PCE			Not Rated	
Portsmouth	PUH			Not Rated	
Quarry	QRY			Not Rated	
Ridgeville	RVE	8	0.25	0.16-0.37	2-5
Sherkston	SRK			Not Rated	

Table 9. K-values, K-ranges and erodibility classes for surface soils of the Regional Municipality of Niagara (continued)

Soil map unit component	Map symbol	No. of sites	Mean K-values	K-ranges	Soil erosion potential classes
Silver Hill	SIH	1	0.21	0.21-0.21	2-4
Smithville	SHV	18	0.21	0.14-0.29	2-5
Smithville loamy phase	SHV.L	5	0.28	0.24-0.33	3-5
Tavistock	TVK	30	0.37	0.20-0.49	3-5
Tavistock heavy red phase	TVK.HR	7	0.36	0.22-0.45	3-5
Tavistock red phase	TVK.R	14	0.41	0.25-0.59	3-5
Tavistock till phase	TVK.T	16	0.37	0.26-0.58	3-5
Tavistock till red phase	TVK.TR	4	0.47	0.36-0.60	3-5
Toledo	TLD	155	0.24	0.15-0.45	2-4
Toledo coarse phase	TLD.C	2	0.30	0.29-0.32	3-5
Toledo loamy phase	TLD.L	41	0.35	0.24-0.47	3-5
Toledo loamy red phase	TLD.LR	13	0.35	0.26-0.42	3-5
Toledo peaty phase	TLD.P			Not Rated	
Toledo red phase	TLD.R	50	0.23	0.14-0.42	2-4
Trafalgar	TFG	6	0.25	0.21-0.28	2-5
Trafalgar loamy phase	TFG.L	2	0.38	0.35-0.41	3-5
Trafalgar shallow phase	TFG.S	4	0.35	0.26-0.45	3-5
Tuscola	TUC	31	0.38	0.22-0.50	3-5
Tuscola red phase	TUC.R	23	0.42	0.26-0.62	3-5
Vineland	VLD	55	0.41	0.18-0.68	3-5
Vineland brown phase	VLD.B	20	0.35	0.15-0.57	3-5
Vittoria	VIT	9	0.34	0.19-0.48	3-5
Vittoria red phase	VIT.R	23	0.40	0.10-0.69	3-5
Wainfleet	WAF			Not Rated	
Walsher	WSH	6	0.40	0.15-0.66	3-5
Walsingham	WAM	1	0.25	0.25-0.25	3-5
Wauseon	WUS	5	0.28	0.17-0.40	3-5
Welland	WLL	70	0.18	0.09-0.34	2-5
Welland loamy phase	WLL.L	17	0.28	0.23-0.35	3-5
Welland peaty phase	WLL.P			Not Rated	

Table 10. LS-values for different combinations of slope length and slope gradient

Slope gradient %	Slope length (m)														
	10	15	20	25	30	40	50	60	75	100	125	150	200	250	300
0.2	.063	.069	.073	.076	.080	.084	.088	.091	.095	.101	.105	.109	.111	.120	.125
0.5	.076	.083	.088	.092	.095	.101	.105	.109	.114	.121	.126	.131	.139	.145	.151
0.8	.090	.098	.104	.108	.112	.119	.124	.129	.135	.143	.149	.155	.164	.172	.178
2	.144	.162	.177	.189	.200	.218	.233	.246	.263	.287	.307	.324	.353	.377	.399
3	.205	.232	.253	.270	.285	.311	.333	.351	.376	.410	.438	.463	.504	.539	.570
4	.256	.301	.338	.369	.397	.446	.487	.524	.573	.643	.703	.756	.849	.928	.998
5	.306	.375	.433	.485	.531	.613	.685	.751	.839	.97	1.08	1.19	1.37	1.53	1.68
6	.385	.472	.545	.609	.667	.770	.861	.940	1.05	1.22	1.36	1.49	1.72	1.93	2.11
8	.568	.695	.803	.898	.980	1.14	1.27	1.39	1.56	1.80	2.01	2.20	2.54	2.84	3.11
10	.78	.96	1.11	1.24	1.36	1.57	1.75	1.92	2.15	2.48	2.77	3.04	3.51	3.92	4.29
12	1.03	1.27	1.46	1.63	1.79	2.07	2.31	2.53	2.83	3.27	3.65	4.00	4.62	5.17	5.66
14	1.13	1.61	1.86	2.08	2.28	2.63	2.94	3.22	3.60	4.16	4.65	5.09	5.88	6.57	7.20
16	1.63	1.99	2.30	2.57	2.82	3.25	3.63	3.98	4.45	5.14	5.75	6.30	7.27	8.13	8.90
18	1.97	2.41	2.78	3.11	3.41	3.93	4.40	4.82	5.39	6.22	6.95	7.62	8.80	9.83	10.80
20	2.34	2.86	3.30	3.69	4.05	4.67	5.22	5.72	6.40	7.39	8.26	9.05	10.40	11.70	12.80
25	3.40	4.20	4.80	5.30	5.80	6.75	7.50	8.25	9.25	10.75	12.00	13.00	15.00	17.00	18.50
30	4.60	5.60	6.50	7.25	8.00	9.20	10.25	11.20	12.50	14.50	16.00	18.50	19.00	21.00	—
40	8.25	11.00	10.25	11.50	12.50	14.50	16.25	18.00	20.00	—	—	—	—	—	—

Table 11. Generalized slope effect (LS) values for the Regional Municipality of Niagara

Slope %	Simple slope	Slope length (m)	LS-value	Complex slope	Slope length (m)	LS-value
0-2	B	250	0.24			
2-5	C	200	0.85	c	50	0.49
5-9	D	150	1.85	d	50	1.07
9-15	E	125	3.65	e	25	1.63
15-30	F	100	7.39	f	25	3.69
>30	G	75	12.50	g	25	7.25

Table 12. Potential soil erosion losses for given K-values and slope conditions in the Regional Municipality of Niagara (t/ha/y)

K-value	Slope classes										
	B	C	c	D	d	E	e	F	f	G	g
0.02	0.8	2.9	1.7	6.2	3.6	12.3	5.5	24.8	12.4	42.0	24.4
0.04	1.6	5.7	3.3	12.4	7.2	24.5	11.0	49.7	24.8	84.0	48.7
0.06	2.4	8.6	4.9	18.7	10.8	36.8	16.4	74.5	37.2	126.0	73.1
0.08	3.2	11.4	6.6	24.9	14.4	49.1	21.9	99.3	49.6	168.0	97.4
0.10	4.0	14.3	8.2	31.1	18.0	61.3	27.4	124.2	62.0	210.0	121.8
0.12	4.8	17.1	9.9	37.3	21.6	73.6	32.9	149.0	74.4	252.0	146.2
0.14	5.6	20.0	11.5	43.5	25.2	85.9	38.3	173.8	86.8	294.0	170.5
0.16	6.5	22.9	13.2	49.7	28.8	98.1	43.8	198.6	99.2	336.0	194.9
0.18	7.3	25.7	14.8	55.9	32.4	110.4	49.3	223.5	111.6	378.0	219.2
0.20	8.1	28.6	16.5	62.2	36.0	122.6	54.8	248.3	124.0	420.0	243.6
0.22	8.9	31.4	18.1	68.4	39.6	134.9	60.2	273.1	136.4	462.0	268.0
0.24	9.7	34.3	19.8	74.6	43.1	147.2	65.7	298.0	148.8	504.0	292.3
0.26	10.5	37.1	21.4	80.8	46.7	159.4	71.2	322.8	161.2	546.0	316.7
0.28	11.3	40.0	23.1	87.0	50.3	171.7	76.7	347.6	173.6	588.0	341.0
0.30	12.1	42.8	24.7	93.2	53.9	184.0	82.2	372.5	186.0	630.0	365.4
0.32	12.9	45.7	26.3	99.5	57.5	196.2	87.6	397.3	198.4	672.0	389.8
0.34	13.7	48.6	28.0	105.7	61.1	208.5	93.1	422.1	210.8	714.0	414.1
0.36	14.5	51.4	29.6	111.9	64.7	220.8	98.6	447.0	223.2	756.0	438.5
0.38	15.3	54.3	31.3	118.1	68.3	233.0	104.1	471.8	235.6	798.0	462.8
0.40	16.1	57.1	32.9	124.3	71.9	245.3	109.5	496.6	248.0	840.0	487.2
0.42	16.9	60.0	34.6	130.5	75.5	257.5	115.0	521.4	260.4	882.0	511.6
0.44	17.7	62.8	36.2	136.8	79.1	269.8	120.5	546.3	272.8	924.0	535.9
0.46	18.6	65.7	37.9	143.0	82.7	282.1	126.0	571.1	285.2	966.0	560.3
0.48	19.4	68.5	39.5	149.2	86.3	294.3	131.4	595.9	297.6	1008.0	584.6
0.50	20.2	71.4	41.2	155.4	89.9	306.6	136.9	620.8	310.0	1050.0	609.0
0.52	21.0	74.3	42.8	161.6	93.5	318.9	142.4	645.6	322.4	1092.0	633.4
0.54	21.8	77.1	44.5	167.8	97.1	331.1	147.9	670.4	334.8	1134.0	657.7
0.56	22.6	80.0	46.1	174.1	100.7	343.4	153.4	695.3	347.2	1176.0	682.1
0.58	23.4	82.8	47.8	180.3	104.3	355.7	158.8	720.1	359.6	1218.0	706.4
0.60	24.2	85.7	49.4	186.5	107.9	367.9	164.3	744.9	372.0	1260.0	730.8
0.62	25.0	88.5	51.0	192.7	111.5	380.2	169.8	769.7	384.4	1302.0	755.2
0.64	25.8	91.4	52.7	198.9	115.1	392.5	175.3	794.6	396.8	1344.0	799.5
0.66	26.6	94.3	54.3	205.1	118.6	404.7	180.7	819.4	409.2	1386.0	803.9
0.68	27.4	97.1	56.0	211.3	122.2	417.0	186.2	844.2	421.6	1428.0	828.2
0.70	28.2	100.0	57.6	217.6	125.8	429.2	191.7	869.1	433.9	1470.0	852.6
0.72	29.0	102.8	59.3	223.8	129.4	441.5	197.2	893.9	446.3	1512.0	877.0
0.74	29.8	105.7	60.9	230.0	133.0	453.8	202.6	918.7	458.7	1554.0	901.3
0.76	30.6	108.5	62.6	236.2	136.6	466.0	208.1	943.6	471.1	1596.0	925.7
0.78	31.5	111.4	64.2	242.4	140.2	478.3	213.6	968.4	483.5	1638.0	950.0
0.80	32.3	114.2	65.9	248.6	143.8	490.6	219.1	993.2	495.9	1680.0	974.4

Table 13. C factor values for field and horticultural crops in the Regional Municipality of Niagara

Crop	Previous crop	Management before crop	C-value
Field crops			
Corn (grain)	corn, grain	Fall MP[1]	0.42
	winter wheat	Spring MP	0.41
	corn, grain (2nd year after sod)	Fall MP	0.39
	corn, grain	Fall chisel	0.34
	forage/sod	Fall MP	0.22
Corn (silage)	corn, grain	Fall MP	0.62
	corn, grain (2nd year after sod)	Fall MP	0.57
	forage/sod	Fall MP	0.31
Spring Grain (barley, oats, mixed)	corn	Fall MP	0.32
	grain	Fall MP	0.30
	corn, grain	Fall chisel	0.29
	corn (2nd year after sod)	Fall MP	0.28
	grain, underseeded with forage	Fall MP	0.10
Alfalfa	first year, if direct seeded	Fall MP	0.23
	forage/sod	—	0.02
Red Clover	first year, if direct seeded	Fall MP	0.22
	forage/sod	—	0.015
Soybeans	soybeans	Fall MP	0.60
	soybeans (2nd year after sod)	Fall MP	0.55
	soybeans	Fall chisel	0.54
	corn, grain	Fall MP	0.53
	corn (2nd year after sod)	Fall MP	0.49
	corn, grain	Fall chisel	0.39
	forage/sod	Fall MP	0.26
Winter Wheat	corn	Fall MP	0.29
	corn	Fall chisel	0.21
	spring grain, winter wheat	Fall MP	0.17
	forage/sod	Fall MP	0.09
Vegetables			
Cabbage/Cauliflower (Early)	field/vegetable crop	Fall MP	0.56
	field/vegetable crop	Spring MP	0.49
	winter cover crop (e.g. rye)	Fall MP	0.26
Cabbage/Cauliflower (Late)	field/vegetable crop	Fall MP	0.54
	field/vegetable crop	Spring MP	0.49
Celery (Late)	field/vegetable crop	Fall MP	0.57
	field/vegetable crop	Spring MP	0.51
Corn, sweet	field/vegetable crop	Fall MP	0.52
	field/vegetable crop	Spring MP	0.42
	field/vegetable; rye follows corn	Fall MP	0.29
Lettuce	field/vegetable crop	Spring disc	0.35
Peppers	field/vegetable crop	Fall MP	0.64
	field/vegetable crop	Spring MP	0.55
Tomatoes (Market)	field/vegetable crop	Fall MP	0.53
	field/vegetable crop	Spring MP	0.43
	field/vegetable; rye after crop	Fall MP	0.26
Tomatoes (Processing)	field/vegetable crop	Fall MP	0.55
	field/vegetable crop	Spring MP	0.45

Table 13. C factor values for field and horticultural crops in the Regional Municipality of Niagara (continued)

Crop	Previous crop	Management before crop	C-value
Fruits			
Apples[2]	first 3 years, no ground cover		0.38
	after 3 years, permanent sod, herbicide strip[3]		0.026
Cherries[2]	permanent sod; herbicide strip[3]		0.026
Grapes[4]	no ground cover[5]		0.36
	winter rye cover crop[6]		0.09
	permanent sod[7]		0.013
Nursery[8] (fruit trees, shrubs)	1 crop harvested every 2 years[9]		0.41
Peaches[2]	no ground cover[5]		0.38
	winter rye cover crop[6]		0.09
Pears[2]	permanent sod; herbicide strip[3]		0.026
Plums	permanent sod; no herbicide strip		0.003
Sod	1 crop harvested every 2 years[9]		0.13
Strawberries	continuous strawberries[10]		0.22

[1]*MP — moldboard plough, conventional tillage (disc/cultivate twice, then plant)*

[2]*Assumed an annual canopy cover of 33 percent and average height of 6½ feet*

[3]*Assumed that all orchard ground cover is grass except for a 2-3 ft. wide bare strip directly under trees (70 percent of ground surface covered)*

[4]*Assumed 25 percent annual canopy cover and average height of 20 inches*

[5]*No appreciable ground cover; area is tilled to keep weeds under control*

[6]*Assumed 40 percent annual grass ground cover*

[7]*Assumed 80 percent annual grass cover for total area, area in grape row has no ground cover*

[8]*Assumed no appreciable canopy or ground cover; average height of 20 inches*

[9]*Management includes — fall moldboard plough with conventional tillage and planting in spring, harvest the following fall and moldboard plough*

[10]*Management includes — mow after harvest, strawcover in fall, discing between rows in spring*

[11]*Grain corn C-values used in rotational C calculation*

Table 14. C factor values for common crop rotations in the Regional Municipality of Niagara

Rotations	C-value
continuous corn (grain)	0.42
corn-corn-corn-corn-spring grain[11]	0.40
corn-corn-corn-corn-winter wheat	0.39
corn-corn-soybeans-soybeans-winter wheat-red clover	0.34
corn-soybeans-winter wheat-red clover	0.25
corn-spring grain-winter wheat-red clover	0.23
forage-forage-forage-corn-corn-spring grain (underseeded)	0.13
forage-forage-forage-corn-spring grain (underseeded)	0.07

Table 15. Conservation or management practice factor (P) values for the Regional Municipality of Niagara

Practice	P-value
Up and down slope farming (cultivation and planting)	1.00
Cross-slope farming	0.75
Contour farming (2-7 percent slopes)	0.50
Strip-cropping, cross slope	0.37
Strip-cropping, on contour	0.25

Table 16. Guidelines for assessing soil erosion potential classes

Soil erosion potential classes		Potential soil loss (t/ha/y)
1	Very Slight	< 6
2	Slight	6-11
3	Moderately Severe	11-22
4	Severe	22-33
5	Very Severe	> 33

GLOSSARY*

Alluvial — refers to material deposited by rivers and streams, usually on riverbeds and floodplains.

Bench — refers to a high terrace that slopes gently from the Niagara Escarpment on the south, to the old beach line of glacial Lake Iroquois on the north.

Colluvial — describes soil material that has moved downhill and accumulated on lower slopes and/or at the base of slopes.

Distinct mottles — spots of colour in soil horizons, caused by impeded drainage, whose contrast with the basic horizon colour is low.

Eluvial horizon — a soil horizon formed by the process of leaching of carbonates, iron, humus etc., by soil solutions.

Fen — a very poorly drained peat landform characterized by a shallow to deep peat layer, and by a dominantly sedge type of vegetation.

Fibric material — organic soil material containing large amounts of weakly decomposed fibre, whose botanical origin is readily identifiable.

Gley colours — gray colours and mottles caused by the reduction of iron and other elements under poor drainage conditions.

Hue — one of the three variables of soil colour (hue, chroma, value). It is described by soil colour rotations ranging from 10R (reddish) to N (gray).

Humic material — refers to highly decomposed organic soil material containing little fibre.

Illuvial horizon — a soil horizon in which material, such as iron or clay has accumulated, that has been leached from overlying soil horizons.

Inclusions — minor proportions of soils or nonsoils within a soil delineation, that occur in unmappable amounts (usually less than 10 percent of the total area).

Kame — an irregular ridge or hill of stratified glacial drift deposited by glacial meltwater.

Lacustrine deposit — material deposited in lake water, and later exposed, either by lowering of the water level, or by uplifting of the land.

Map delineation — any map area enclosed by a continuous boundary. A map polygon.

Mesic material — refers to organic soil material at a stage of decomposition between that of fibric and humic materials.

Moraine — an accumulation of earth, generally with stones, carried and finally deposited by a glacier.

Physiography — a description of natural phenomena e.g. The Physiography of Southern Ontario (3) describes the landforms of the surface of southern Ontario.

Prominent mottles — spots of colour in soil horizons, caused by impeded drainage, whose contrast with the basic horizon colour is high.

Sedge — tufted marsh plants that differ from grasses by having solid stems.

Soil map unit components — soil members of a map unit that are described in the map legend e.g. SHV and LIC soils are components of the SHV 5 map unit.

Soil consistence — the degree of cohesion or adhesion of the soil mass.

Soil horizon — a layer of soil approximately parallel to the land surface, that differs from adjacent layers in properties such as texture, colour, structure, etc.

Soil morphology — the constitution of the soil, including the texture, structure, consistence, colour and other physical, chemical and biological properties of the various soil horizons that make up the soil profile.

Soil permeability — the ease with which gases and liquids penetrate or pass through soil.

Soil profile — a vertical section of the soil through all its horizons, and extending into the parent material.

Soil reaction — the degree of acidity or alkalinity of a soil, usually expressed as a pH value.

Soil structure — the combination or arrangement of primary soil particles into secondary particles, units or peds.

Soil texture — the relative proportions of the various particle size fractions in a soil, as described by the classes of soil texture shown in Figure 14. The sand portion of the triangle may be further subdivided into coarse sand, sand, fine sand and very fine sand, based on the proportions of various sand sizes within the sand fraction. Likewise, loamy sand may be divided into loamy coarse sand, loamy sand, loamy fine sand and loamy very fine sand. When the percentage gravel, by volume, is between 20 and 50 percent, the textural class name is modified by "gravelly", e.g. "gravelly sandy loam". When the gravel percentage is between 50 and 90 percent, the textural class name is modified by "very gravelly", e.g. "very gravelly sandy loam".

Figure 14. Soil texture classes.

Soil tilth — the physical condition of soil, as related to its ease of tillage, fitness as a seedbed, and its impedance to seedling emergence and root penetration.

Stereoscope — an optical instrument with two eyeglasses for helping the observer to combine the images of two pictures taken from points of view a little way apart, and thus to get the effect of depth. It is used to obtain a 3-dimensional image of the land surface from airphotos.

Surficial geology — that branch of geology dealing with surface landforms and the unconsolidated materials that comprise them.

Tender fruit crops — term applied in southern Canada to fruit crops such as apricots, cherries and peaches, that are particularly sensitive to low winter or spring temperatures.

Till — a sediment of diverse texture and structure, deposited by direct glacier action; it is characteristically compact, poorly sorted and unstratified.

*Most definitions for this glossary were based on the following sources:

Agriculture Canada, Research Branch, Revised 1976, Glossary of Terms in Soil Science, Publication 1459, 44 pp.

Soil Conservation Society of America, 1970, Resource Conservation Glossary, 52 pp.

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APPENDIX

Generalized Soil Information for Selected Soils in the Regional Municipality of Niagara

ALLUVIUM 1 (1-ALU)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Variable floodplain deposits

DRAINAGE Variable

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	20	0	14	4	50	36	SICL	5.0	6.2	0.0
Bg1	8	50	0	12	4	49	39	SICL	2.0	6.0	0.1
Bg2	7	75	1	13	3	44	43	SIC	1.6	6.4	0.2
Ckg	3		2	8	1	41	51	SIC		7.6	11.6

ALLUVIUM 3 (3-ALU)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly medium-textured loamy floodplain deposits

DRAINAGE Variable

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	7	22	1	17	6	59	24	SIL	4.3	6.7	
Bmgj	5	57	0	17	8	64	19	SIL	0.8	6.8	
Btgj	2	70	0	10	4	61	29	SICL	1.0	6.0	
Ckgj	3		5	19	9	71	10	SIL	0.2	7.7	15.3

ALLUVIUM 4 (4-ALU)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly fine-textured clayey floodplain deposits

DRAINAGE Variable

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	7	24	0	8	0	44	48	SIC	5.1	6.3	
Bg1	8	48	0	8	1	47	45	SIC	2.2	6.2	
Bg2	8	79	0	8	3	46	46	SIC	1.3	6.4	
Bg3	4		0	16	5	47	37	SICL	0.6	6.4	

BENNINGTON SOIL (BNG)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over lacustrine silty clay

DRAINAGE Well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	27	2	47	33	40	13	L	2.2	6.3	0.8
Bm	5	40	0	40	33	45	15	L	2.1	5.8	0.1
Bt1	4	61	0	38	31	38	24	L	0.5	6.5	0.4
Bt2	3	65	0	25	18	55	20	SIL	1.2	4.9	0.0
IIBt	4	86	0	6	0	48	46	SIC	0.6	5.6	0.0
IICk	2		0	4	0	58	38	SICL		7.6	12.4

BERRIEN SOIL (BRR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over lacustrine ...ay

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	10	19	0	66	29	23	11	VFSL	2.9	6.0	
Bmgj	9	43	0	74	34	17	9	VFSL	0.8	6.3	
Aegj	7	44	0	76	33	18	6	VFSL	0.4	5.8	
Btgj	6	60	0	60	25	22	18	VFSL	0.4	6.5	
IIBtgj	5	79	1	12	3	39	49	C	1.3	6.7	
IICkg	11		0	8	2	46	46	SIC		7.6	11.9

BERRIEN SOIL - RED PHASE (BRR.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued sandy textures over lacustrine silty clay

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	19	5	73	20	18	9	FSL	2.3	6.0	
Bmgj	4	42	4	73	24	18	9	FSL	0.5	6.3	
Btgj	3	54	0	66	23	19	15	FSL	0.4	6.2	
IICkg	4		2	10	3	48	42	SIC	0.1	7.5	13.8

BERRIEN SOIL - TILL PHASE (BRR.T)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over clay loam till

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	12	24	3	66	20	23	11	FSL	2.6	6.3	0.5
Bmgj	9	51	4	77	21	16	7	FSL	0.6	6.1	0.1
IIBtgj	4	63	12	39	12	34	27	CL	0.4	6.7	0.3
IIBm	7	66	9	61	13	24	15	FSL	0.3	6.9	2.7
IICkg	8		5	22	10	51	27	CL		7.5	9.3

BEVERLY SOIL (BVY)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine silty clay

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	93	17	0	14	6	52	34	SICL	3.6	6.2	0.3
Bmgj	22	42	0	10	4	51	39	SICL	1.4	6.3	0.4
Btgj	84	45	0	7	1	45	48	SIC	1.1	6.3	0.4
Ckgj	76		0	5	1	46	49	SIC	0.1	7.6	14.1

BEVERLY SOIL - LOAMY PHASE (BVY.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over lacustrine silty clay

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	75	19	1	25	15	51	24	SIL	3.7	6.2	0.4
Bmgj	31	33	1	30	18	47	23	L	1.4	6.1	0.2
IIBtgj	73	50	0	12	6	44	44	SIC	0.9	6.4	0.2
IICkgj	74		0	7	2	49	44	SIC	0.0	7.5	14.5

BEVERLY SOIL - LOAMY RED PHASE (BVY.LR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued lacustrine silty clay

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	15	18	0	23	13	53	24	SIL	3.6	6.3	0.1
IIBmgj	10	53	0	13	7	51	36	SICL	0.7	6.3	0.7
IIBtgj	13	56	0	9	2	45	46	SIC	0.8	6.1	0.5
IICkgj	11		0	5	1	48	47	SIC		7.5	13.5

BRADY SOIL (BAY)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine loamy sand and sand

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	5	26	1	84	11	10	6	LS	3.0	6.1	0.2
Bmgj1	7	69	0	88	9	9	3	S	0.5	6.0	
Bmgj2	2	88	1	93	6	4	3	FS	0.4	6.0	
Ckgj	2		2	94	1	4	2	S		7.4	6.0

BRANT SOIL (BRT)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine silt loam and loam

DRAINAGE Well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	19	1	22	15	60	18	SIL	2.8	5.5	
Bm1	4	51	0	18	13	64	18	SIL	1.1	5.6	
Bm2	8	68	2	31	21	56	13	SIL	1.1	5.2	
Ck	1		0	27	13	51	22	SIL		7.5	3.4

BRANT SOIL - RED PHASE (BRT.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine silt loam and loam

DRAINAGE Well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	14	20	1	36	25	51	13	SIL	2.4	5.7	
Bt	15	65	0	28	22	54	18	SIL	0.6	5.4	
Bm1	14	73	1	38	32	53	9	SIL	0.4	5.9	0.1
Bm2	13	107	1	39	31	53	8	SIL	0.2	6.3	0.1
Ck	3		1	17	10	69	14	SIL		7.6	7.6

BRANTFORD SOIL (BFO)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine silty clay

DRAINAGE Moderately well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	20	18	0	13	5	51	36	SICL	3.7	6.4	1.1
Bm	8	43	0	11	3	51	38	SICL	1.8	6.0	1.0
Bt	18	51	0	8	2	45	47	SIC	1.3	6.3	0.4
Ck	18		0	6	1	45	49	SIC	0.2	7.6	15.0

BRANTFORD SOIL - LOAMY PHASE (BFO.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over lacustrine silty clay

DRAINAGE Moderately well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	11	19	0	21	11	54	25	SIL	4.5	6.6	0.4
Bm	6	27	0	27	14	51	22	SIL	1.2	5.4	0.0
IIBt	15	58	0	9	2	44	47	SIC	0.9	6.4	0.1
IICk	10		0	5	1	47	48	SIC	0.1	7.6	13.0

BRANTFORD SOIL - RED PHASE (BFO.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine silty clay

DRAINAGE Moderately well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	20	0	10	3	54	36	SICL	3.9	6.7	2.3
Bm	1	46	0	6	0	55	39	SIC	2.1	7.0	5.8
Bt	4	51	0	8	4	45	47	SIC	1.6	6.8	0.8
Ck	3		0	5	0	42	53	SIC	0.3	7.7	15.4

BROOKE SOIL - SHALLOW PHASE (BOK.S)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 50 to 100 cm variable textures over mainly limestone and dolostone bedrock

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	9	21	2	24	9	44	32	CL	6.0	6.0	0.2
Btg	5	37	0	15	5	34	51	C	1.2	6.4	1.0
Bg	6	46	2	25	11	41	34	CL	1.2	7.0	0.4
Ckg	5	73	5	24	8	41	35	CL	0.1	7.6	17.7
R											

BROOKE SOIL - VERY SHALLOW PHASE (BOK.V)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 20 to 50 cm variable textures over mainly limestone and dolostone bedrock

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	12	17	1	13	4	52	35	SICL	4.6	6.7	0.7
Btg	4	28	1	10	3	47	43	SIC	1.1	7.0	0.0
Bg	7	34	4	15	5	50	35	SICL	1.6	6.9	0.3
Ckg	7	43	1	11	4	53	36	SICL	0.2	7.6	17.3
R											

CHINGUACOUSY SOIL (CGU)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly clay loam till

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	21	19	5	24	9	47	29	CL	3.1	6.5	0.4
Bmgj	17	50	2	19	8	49	32	SICL	0.1	6.4	0.0
Btgj	17	52	2	16	6	45	39	SICL	0.9	6.2	0.2
Ckgj	17		4	16	6	48	36	SICL	0.1	7.5	8.3

CHINGUACOUSY SOIL - LOAMY PHASE (CGU.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over clay loam till

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	22	19	3	27	12	50	23	SIL	3.5	6.6	0.7
Bm	11	30	4	31	13	50	19	SIL	1.7	6.3	0.1
IIBtgj1	8	39	2	23	9	41	36	CL	1.1	6.2	0.2
IIBtgj2	30	54	3	18	6	44	38	SICL	0.7	6.2	0.1
IICkgj	19		3	17	5	47	36	SICL	0.1	7.5	6.7

CHINGUACOUSY SOIL - LOAMY RED PHASE (CGU.LR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued clay loam till

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	12	18	5	27	10	49	24	SIL	4.0	6.3	0.5
IIBmgj	2	38	4	18	7	47	35	SICL	0.9	5.5	0.0
IIBtgj1	8	54	3	18	7	43	39	SICL	0.8	6.0	0.1
IIBtgj2	4	57	2	18	6	41	41	SIC	0.8	6.9	2.0
IICkgj	8		6	16	6	48	36	SICL	0.3	7.4	11.2

CHINGUACOUSY SOIL - RED PHASE (CGU.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued clay loam till

DRAINAGE Moderately well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	9	20	2	28	9	42	30	CL	3.6	6.5	0.3
Bmgj	6	48	3	24	9	42	34	CL	0.7	6.2	0.1
Btgj	6	60	2	17	7	43	40	SICL	0.8	6.0	0.3
Ckgj	6		7	19	7	41	40	SICL		7.6	13.2

CHINGUACOUSY SOIL - RED WASHED PHASE (CGU.RW)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Washed reddish-hued clay loam till, modified by lacustrine processes

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	21	20	6	40	15	42	18	L	3.6	6.3	0.2
Bmgj	21	51	6	38	14	43	19	L	1.9	6.2	0.5
Btgj	13	54	5	31	12	41	28	CL	1.3	5.9	0.1
Ckgj	14		7	30	12	50	20	SIL		7.5	10.1

CHINGUACOUSY SOIL - WASHED PHASE (CGU.W)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Washed clay loam till, modified by lacustrine processes

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	21	21	5	34	15	46	20	L	3.0	6.6	0.8
Bmgj	18	48	5	31	13	45	24	L	0.9	6.6	0.4
Btgj	13	55	7	31	12	41	28	CL	0.7	6.7	0.2
Ckgj	13		9	31	11	47	22	L	0.1	7.5	8.6

COLWOOD SOIL (CWO)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine silt loam

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	16	24	0	36	25	44	20	L	6.2	6.6	0.5
Bg	14	50	0	34	24	44	22	L	0.9	6.8	1.0
Ckg	16		0	27	19	55	18	SIL		7.5	15.2

COLWOOD SOIL - RED PHASE (CWO.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine silt loam

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	22	1	34	21	48	18	SIL	2.7	6.4	0.1
Btg	9	52	0	28	18	44	28	CL	0.8	6.5	0.2
Bg	6	82	2	40	25	46	14	L	0.6	6.9	0.4
Ckg	3		0	28	21	57	15	SIL		7.6	12.9

FARMINGTON SOIL - SHALLOW PHASE (FRM.S)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 50 to 100 cm variable textures over mainly limestone and dolostone bedrock

DRAINAGE Rapid

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	17	4	39	14	40	21	L	6.2	6.8	0.8
Bm1	6	37	9	44	10	41	15	L	1.5	6.3	0.1
Bt	2	59	6	38	11	34	28	CL	0.5	6.6	0.4
Bm2	2	64	9	50	6	39	11	L	1.0	5.7	0.0
R											

FARMINGTON SOIL - VERY SHALLOW PHASE (FRM.V)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 20 to 50 cm variable textures over mainly limestone and dolostone bedrock

DRAINAGE Rapid

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	11	19	11	33	14	48	19	L	6.3	6.9	3.7
Bm	10	33	10	32	14	49	19	L	2.6	6.8	2.9
R	11										

FONTHILL SOIL (FNT)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued coarse sandy loam and gravelly sand

DRAINAGE Rapid

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	27	24	15	67	14	24	9	CSL	2.1	5.9	1.1
Bm1	36	48	20	72	13	21	7	GCSL	1.2	5.8	0.9
Btj	15	68	19	71	18	20	9	SL	0.4	5.5	
Bm2	20	87	17	80	9	14	6	LCS	0.3	5.4	
Bm3	11	115	16	82	9	12	6	LCS	0.1	5.4	
Ck	4		33	85	3	9	6	GLCS		7.3	19.5

FOX SOIL (FOX)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine sand and loamy sand

DRAINAGE Rapid

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	22	8	68	8	23	9	SL	2.2	5.5	
Bm1	4	49	8	80	8	15	5	LS	0.6	5.2	
Bm2	4	79	13	87	6	9	4	S	0.3	5.3	
Bm3	4		4	87	6	9	4	S	0.2	5.5	

FOX SOIL - RED PHASE (FOX.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine sand and loamy sand

DRAINAGE Rapid

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	5	22	2	74	15	17	9	SL	2.3	6.2	
Bm1	5	40	3	80	10	16	4	LS	0.5	5.7	
Bm2	3	59	4	85	11	11	4	LS	0.2	5.7	
Bt	7		1	82	34	12	6	LVFS	0.2	5.8	

FRANKTOWN SOIL - SHALLOW PHASE (FKW.S)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 50 to 100 cm variable textures over mainly limestone and dolostone bedrock

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	13	24	3	27	10	48	25	L	4.3	6.3	0.7
Bmgj	7	42	7	46	11	36	18	L	1.0	6.2	0.3
Btgj	14	51	1	17	6	45	38	SICL	0.9	6.8	1.0
Ckgj	5	76	9	33	10	45	22	L	0.1	7.5	21.0
R	13										

FRANKTOWN SOIL - VERY SHALLOW PHASE (FKW.V)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 20 to 50 cm variable textures over mainly limestone and dolostone bedrock

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	11	18	7	32	11	46	22	L	4.4	6.2	0.3
Bmgj	8	35	9	33	11	45	22	L	1.9	6.1	0.3
R	11										

GRIMSBY SOIL (GMY)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine fine sandy loam and very fine sandy loam

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	25	19	1	67	33	25	8	VFSL	2.0	5.6	
Bm1	46	59	1	68	36	25	7	VFSL	0.6	5.5	
Bt	19	80	0	61	36	26	12	VFSL	0.3	5.4	
Bm2	19	83	0	76	41	19	5	LFS	0.3	5.7	
Ck	3		0	78	28	20	2	LFS		7.5	6.3

HALDIMAND SOIL (HIM)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine heavy clay

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	105	15	1	11	2	44	45	SIC	4.1	6.2	0.7
Bmgj	22	31	1	7	1	40	53	C	1.9	6.2	1.2
Btgj	99	35	0	5	1	32	63	HC	1.6	6.2	0.3
Ckgj	99		0	2	0	33	65	HC	0.1	7.6	12.7

HALDIMAND SOIL - LOAMY PHASE (HIM.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over lacustrine heavy clay

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	49	18	1	19	9	49	32	SICL	4.0	6.1	0.6
Bmgj	12	27	0	22	13	47	31	CL	1.9	5.8	0.3
IIBtgj	45	42	0	7	2	34	59	C	1.2	5.9	0.1
IICkgj	49		0	3	0	33	64	HC	0.1	7.5	13.4

HOLLY SOIL (HOY)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Organic soil, swamp associated, 40 to 160 cm deep over loamy mineral soil materials

DRAINAGE Very poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Peat Material and Texture	Stage of Decomposition	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Om1	4	46						woody forest peat	mesic	77.3	5.5	
Om2	3	64						sedge fen peat	mesic	84.0	5.7	
Om3	3	97						sedge fen peat	mesic	70.8	5.7	
IIBg	4	115	0	16	9	55	29	SICL		12.4	6.9	0.7
IICkg	3		0	30	16	52	18	SIL		0.2	7.3	28.4

JEDDO SOIL (JDD)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly clay loam till

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	19	17	2	22	10	46	32	CL	4.3	6.1	0.8
Bg	11	40	3	25	11	40	35	CL	1.1	6.6	0.4
Btg	6	44	2	17	8	38	45	C	1.4	6.1	0.3
Ckg	11		4	19	6	42	39	SICL	0.2	7.6	12.6

JEDDO SOIL - LOAMY PHASE (JDD.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over clay loam till

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	19	21	2	32	15	43	25	L	3.8	6.7	0.5
IIBtg	10	49	2	16	6	42	42	SICL	0.7	6.7	0.1
IIBmgj	6	51	2	29	10	36	35	CL	0.8	6.5	0.1
IICkg	14		3	14	4	45	41	SIC		7.6	10.5

JEDDO SOIL - LOAMY RED PHASE (JDD.LR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued clay loam till

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	23	6	42	16	36	22	L	2.9	6.7	0.2
IIBtg	5	48	2	23	9	39	39	CL	0.8	6.7	0.2
IICkg	6		6	22	9	43	35	CL		7.5	11.6

JEDDO SOIL - RED PHASE (JDD.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued clay loam till

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	18	2	19	7	44	37	SICL	4.9	6.3	0.1
Bmgj	3	37	2	20	8	39	41	C	1.2	7.2	1.9
Bg	3	43	3	17	6	40	43	SIC	1.1	6.1	0.5
Ckg	4		1	16	5	40	44	SIC	0.1	7.7	13.0

JEDDO SOIL - RED WASHED (JDD.RW)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Washed reddish-hued clay loam till, modified by lacustrine processes

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	8	26	7	31	13	44	25	L	4.6	6.6	1.0
Bg	3	42	7	26	11	44	30	CL	0.6	7.1	2.5
Bmgj	4	62	6	35	12	40	25	L	0.5	6.2	0.3
Ckg	7		4	29	11	49	22	SIL		7.6	11.4

JEDDO SOIL - WASHED PHASE (JDD.W)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Washed clay loam till, modified by lacustrine processes

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	12	18	2	31	17	45	24	L	3.6	6.6	0.3
Btg1	8	41	3	28	12	44	28	CL	0.8	6.8	0.3
Btg2	6	53	2	27	12	42	31	CL	0.6	6.9	0.2
Ckg	10		6	27	10	51	22	SIL	0.1	7.6	10.9

LINCOLN SOIL (LIC)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine heavy clay

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	190	15	0	10	2	41	49	C	5.0	5.9	0.3
Bg1	155	40	0	5	1	32	63	HC	1.7	6.1	0.3
Bg2	61	56	0	4	1	31	65	HC	1.2	6.3	0.3
Ckg	178		0	3	0	33	64	HC	0.1	7.6	13.9

LINCOLN SOIL - LOAMY PHASE (LIC.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over lacustrine heavy clay

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	60	19	1	19	8	49	32	SICL	4.4	6.0	0.3
Bmgj	11	27	0	19	10	50	31	SICL	1.5	5.9	0.0
IIBg	59	41	0	8	2	35	57	C	1.2	6.3	0.2
IICkg	59		0	3	0	34	63	HC	0.2	7.6	15.8

LORRAINE SOIL (LRR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Organic soil, fen-associated, 40 to 160 cm deep over clayey mineral soil materials

DRAINAGE Very poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Peat Material and Texture	Stage of Decomposition	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Om1	5	23						woody fen peat	mesic	73.3	5.0	
Om2	5	42						sedge fen peat	mesic	80.2	80.2	
Om3	4	66						woody fen peat	mesic	76.7	76.7	
IIBg	3		0	6	3	50	44	SIC		2.0	6.3	

MALTON SOIL (MAT)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm lacustrine silty clay over clay loam till

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	17	21	0	14	4	48	38	SICL	4.9	6.7	1.0
Bg	13	45	0	9	2	49	42	SIC	1.1	6.6	0.5
IICkg	13		6	16	4	46	38	SICL	0.2	7.7	12.6

MALTON SOIL - RED PHASE (MAT.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued lacustrine silty clay over clay loam till

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	7	18	0	17	8	44	39	SICL	6.7	6.1	
Bg1	5	38	0	11	4	45	44	SIC	1.4	6.2	
Bg2	3	56	0	12	5	41	47	SIC	0.7	7.0	2.6
IICkg	7		5	21	6	43	36	CL		7.7	16.6

MAPLEWOOD SOIL (MPW)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over lacustrine silty clay

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	25	23	0	52	31	32	16	L	4.1	6.9	1.2
Bg1	25	43	1	48	29	35	17	L	0.9	7.0	3.9
Bg2	5	57	0	54	36	32	14	VFSL	0.3	7.5	12.8
IICkg	35		0	19	11	51	30	SICL		7.6	21.7

MAPLEWOOD SOIL - HEAVY PHASE (MPW.H)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over lacustrine heavy clay

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	18	0	43	23	34	23	L	3.9	5.8	
Btgj	3	52	0	28	13	38	34	CL	1.1	5.6	
Bg	5	55	0	51	25	28	21	L	0.6	6.2	
IICkg	4		0	3	0	28	69	HC		7.7	16.0

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps

MAPLEWOOD SOIL - RED PHASE (MPW.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued loamy textures over lacustrine silty clay

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	5	30	1	41	23	38	21	L	3.1	6.4	0.2
Bg	3	56	2	54	30	29	17	SL	0.7	7.0	0.3
IICkg	3		0	6	0	43	51	SIC		7.6	17.3

MAPLEWOOD SOIL - TILL PHASE (MPW.T)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over clay loam till

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	5	19	1	41	18	40	19	L	3.3	6.3	0.7
Bg	7	51	2	36	14	41	23	L	0.7	6.7	0.9
IICkg	6		4	24	9	44	32	CL		7.5	14.3

MORLEY SOIL (MOY)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued silty clay loam at least 1 m thick over Queenston shale bedrock

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	7	20	0	13	4	42	45	SIC	4.5	6.7	0.6
Bg1	7	48	0	12	3	43	45	SIC	1.1	6.9	0.2
Bg2	4	85	0	12	5	48	40	SICL	0.4	7.3	1.0
Ckg	2		0	3	0	64	33	SICL		7.7	1.6
R	7										

MORLEY SOIL - SHALLOW PHASE (MOY.S)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 50 to 100 cm reddish-hued silty clay loam over Queenston shale bedrock

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	18	1	15	3	51	34	SICL	3.8	6.8	0.5
Bg1	5	52	0	9	2	54	37	SICL	0.8	5.6	0.2
Bg2	2	60	2	14	2	48	38	SICL	0.8	5.4	0.1
Ckg	3	75	1	17	4	58	25	SIL	0.3	7.6	4.3
R	6										

NIAGARA SOIL (NGR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine heavy clay

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	19	18	1	14	5	46	40	SICL	3.8	6.1	0.2
Btgj1	15	42	0	4	0	35	61	HC	1.2	6.3	0.4
Btgj2	6	57	0	3	0	33	64	HC	0.8	6.7	0.3
Ckgj	16		0	2	0	36	62	HC		7.7	11.8

NIAGARA SOIL - LOAMY PHASE (NGR.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued lacustrine heavy clay

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	12	17	1	17	5	53	30	SICL	4.4	6.6	0.5
Bmgj	3	24	0	20	9	55	25	SIL	2.2	6.6	0.0
IIBtgj	10	42	0	9	3	39	52	C	0.9	6.7	0.4
IICkgj	11		0	3	0	37	60	HC	0.1	7.6	10.6

ONEIDA SOIL (OID)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly clay loam till

DRAINAGE Moderately well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	21	4	20	8	50	30	CL	2.4	6.7	0.7
Bmj	4	52	2	18	7	49	33	SICL	0.8	6.4	0.6
Btj	10	56	3	17	6	48	35	SICL	1.0	6.6	0.5
Ck	8		3	13	4	51	36	SICL		7.5	6.9

ONEIDA SOIL - LOAMY PHASE (OID.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over clay loam till

DRAINAGE Moderately well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	19	7	32	12	48	20	L	2.5	6.6	0.2
IIBt	6	58	2	18	7	46	36	SICL	0.8	6.2	0.2
IICk	4		4	17	6	50	33	SICL		7.5	5.9

ONEIDA SOIL - RED WASHED PHASE (OID.RW)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Washed reddish-hued clay loam till, modified by lacustrine processes

DRAINAGE Moderately well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	22	3	40	17	39	21	L	3.9	6.4	0.7
Bm1	5	39	7	39	17	41	20	L	1.4	5.7	0.9
Bm2	2	64	3	38	19	41	21	L	0.2	5.8	0.0
Bt	5	75	5	29	10	41	30	CL	0.9	6.1	0.7
Ck	4		11	36	15	41	23	L		7.4	11.4

ONEIDA SOIL - WASHED PHASE (OID.W)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Washed clay loam till, modified by lacustrine processes

DRAINAGE Moderately well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	10	22	6	35	12	47	18	L	2.8	6.1	0.4
Bm	6	55	12	37	11	42	21	L	1.1	6.1	1.3
Bt	12	65	6	29	8	41	30	CL	1.1	6.1	0.6
Ck	8		6	27	7	46	27	L	0.2	7.5	10.9

ONTARIO SOIL (OTI)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine heavy clay

DRAINAGE Moderately well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	15	0	11	4	45	44	SIC	3.8	6.2	1.0
Bm	3	37	0	6	0	33	61	HC	1.5	6.1	2.1
Bt	3	42	0	4	0	32	64	HC	1.7	6.5	0.4
Ck	4		0	2	0	28	70	HC	0.7	7.7	15.7

PEEL SOIL (PEL)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm lacustrine silty clay over clay loam till

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	21	0	18	9	53	29	SICL	4.2	6.5	0.1
Btgj	4	51	0	9	4	49	42	SIC	0.8	6.8	0.5
IIBtgj	1	64	0	15	11	48	37	SICL	0.8	7.2	0.4
IICkgj	3		2	9	2	47	44	SIC		7.6	14.5

PEEL SOIL - LOAMY PHASE (PEL.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over PEL soils

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	20	2	21	9	52	27	SIL	4.8	6.3	0.3
Bmgj	3	34	0	22	11	46	32	CL	0.9	5.9	0.0
IIBtgj	4	59	0	11	4	47	42	SIC	0.5	6.2	1.0
IIICkg	3		3	9	2	53	38	SICL		7.6	15.2

QUARRY SOIL (QRY)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Organic soil, swamp-associated, 40 to 160 cm deep over clayey mineral soil materials

DRAINAGE Very poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Peat Material and Texture	Stage of Decomposition	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Om1	4	43						woody forest peat	mesic	74.0	5.6	
Om2	4	69						woody forest peat	mesic	68.7	5.6	
Om3	2	85						woody forest peat	mesic	71.7	5.3	
IIBg	2	112	0	6	0	46	48	SIC		1.9	6.1	
IICkg	2		0	19	7	53	28	SICL		0.3	7.5	11.9

RIDGEVILLE SOIL (RVE)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued coarse sandy loam and gravelly sand

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	8	22	8	60	17	29	11	FSL	2.9	5.9	
Bmgj1	13	62	14	77	17	17	6	LCS	0.5	6.2	
Bmgj2	5	83	21	83	13	12	5	GLCS	0.2	6.0	
Ckg	2		16	59	12	34	7	CSL		7.3	6.5

SMITHVILLE SOIL (SHV)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine heavy clay

DRAINAGE Moderately well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	17	14	0	11	3	45	44	SIC	3.8	6.3	0.2
Bt	15	33	0	5	1	34	61	HC	1.6	6.3	0.2
Ck	15		0	3	0	34	63	HC	0.1	7.5	13.2

SMITHVILLE SOIL - LOAMY PHASE (SHV.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over lacustrine heavy clay

DRAINAGE Moderately well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	5	20	1	18	8	49	33	SICL	3.6	5.9	0.7
IIBt	5	47	0	6	2	31	63	HC	0.9	5.9	1.8
IICk	5	100	0	3	0	36	61	HC	0.3	7.5	16.6

TAVISTOCK SOIL (TVK)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over lacustrine silty clay

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	31	22	1	50	29	35	15	L	3.7	6.3	0.2
Bmgj	24	43	0	53	33	32	15	VFSL	1.1	6.2	0.0
Btgj	17	54	0	43	28	36	21	L	0.6	6.3	0.6
IIBtgj	12	64	0	21	12	44	35	CL	0.6	6.4	0.3
IICkgj	25		0	7	2	49	44	SIC		7.5	16.7

TAVISTOCK SOIL - HEAVY PHASE (TVK.H)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over lacustrine heavy clay

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	7	17	1	34	23	43	23	L	4.0	6.4	0.6
Bmgj	7	36	0	43	28	39	18	L	1.2	5.9	
IIBtgj	6	68	0	13	6	29	58	C	0.6	6.1	
IICkg	5		0	5	0	30	65	HC		7.6	14.6

* although there are local occurences of this soil, the areas were to small to map and therefore do not appear on the soil maps

TAVISTOCK SOIL - RED PHASE (TVK.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued loamy textures over lacustrine silty clay

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	14	22	1	52	31	34	14	VFSL	3.1	6.0	0.6
Bmgj	20	45	0	60	39	30	10	VFSL	0.9	6.0	0.3
Btgj	10	59	0	56	36	27	17	VFSL	0.4	6.7	0.5
IIBtgj	6	77	0	20	11	40	40	SICL	0.4	5.2	0.0
IICkgj	10		0	10	4	50	40	SICL	0.1	7.5	12.7

TAVISTOCK SOIL - TILL PHASE (TVK.T)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over clay loam till

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	16	22	4	50	29	34	16	L	3.2	6.4	0.5
Bmgj	14	42	4	52	30	32	16	VFSL	1.1	6.3	0.2
Btgj	9	55	1	42	28	36	22	L	0.5	6.4	0.1
IIBtgj	9	80	2	25	12	43	32	CL	0.5	6.8	1.1
IICkgj	12		4	18	7	46	36	SICL	0.0	7.6	11.9

TAVISTOCK SOIL - TILL RED PHASE (TVK.TR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued loamy textures over clay loam till

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	21	2	53	41	34	13	VFSL	3.4	6.8	1.2
Bmgj	4	[illegible]	2	59	46	31	10	VFSL	0.9	6.9	0.2
Btgj	3	67	5	37	27	49	14	SIL	1.0	6.9	0.3
IICkgj	2		8	23	13	59	18	SIL	0.0	7.6	7.4

TOLEDO SOIL (TLD)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine silty clay

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	160	18	0	13	5	49	38	SICL	4.8	6.2	0.3
Bg1	153	43	0	9	3	43	48	SIC	1.3	6.3	0.3
Bg2	47	59	0	10	4	42	48	SIC	1.0	6.6	0.6
Ckg	148		0	5	1	48	47	SIC	0.1	7.6	15.2

TOLEDO SOIL - LOAMY RED PHASE (TLD.LR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued lacustrine silty clay

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	13	22	1	30	17	46	24	L	3.5	6.2	0.2
IIBg	6	44	1	24	11	37	39	CL	0.7	6.9	0.4
IIBtgj	9	47	0	11	5	47	42	SIC	0.8	6.7	0.2
IICkg	10		1	9	3	50	41	SIC		7.7	14.7

TOLEDO SOIL - RED PHASE (TLD.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine silty clay

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	43	18	1	16	6	47	37	SICL	5.4	6.2	1.2
Bg	41	47	0	9	3	44	47	SIC	1.3	6.6	1.1
Ckg	31		0	6	1	48	46	SIC	0.1	7.6	16.3

TRAFALGAR SOIL (TFG)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued silty clay loam at least 1 m thick over Queenston shale bedrock

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	17	1	12	2	51	37	SICL	3.0	6.6	0.6
Bmgj	3	45	0	7	0	55	38	SICL	0.6	6.2	0.0
Btgj	2	59	1	5	0	49	46	SIC	0.7	5.4	0.0
Ckgj	3	100	0	10	4	58	32	SICL		7.6	3.7
R	4										

TRAFALGAR SOIL - SHALLOW PHASE (TFG.S)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 50 to 100 cm reddish-hued silty clay loam over Queenston shale bedrock

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	7	16	2	16	3	50	34	SICL	2.7	6.6	0.5
Bmgj	4	39	3	20	4	46	34	SICL	1.4	5.9	0.0
Btgj	3	65	1	9	1	52	39	SICL	0.7	5.8	0.0
Ckgj	6	80	0	11	3	65	24	SIL		7.5	4.5
R	7										

TUSCOLA SOIL (TUC)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine silt loam

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	31	21	0	34	21	48	18	L	3.5	6.4	0.2
Bmgj	27	55	0	33	22	50	17	SIL	0.8	6.4	0.2
Btgj1	24	60	0	28	20	49	23	SIL	0.5	6.3	0.1
Btgj2	5	83	0	22	16	54	24	SIL	0.4	6.0	0.0
Ckgj	17		0	23	13	58	19	SIL		7.6	9.8

TUSCOLA SOIL - RED PHASE (TUC.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine silt loam

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	28	23	1	43	29	42	15	L	2.7	6.1	0.1
Bmgj1	31	57	0	42	30	44	14	L	0.7	5.7	0.2
Bmgj2	9	90	0	42	33	48	10	L	0.3	5.7	0.0
Btgj1	20	61	0	31	22	45	24	L	0.4	6.1	0.0
Btgj2	5	72	1	24	18	52	24	SIL	0.3	6.2	0.0
Ckgj	13		1	27	16	57	16	SIL		7.5	9.5

VINELAND SOIL (VLD)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine fine sandy loam and very fine sandy loam

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	62	23	1	65	38	25	9	VFSL	2.7	6.1	0.5
Bmgj1	79	53	1	70	39	23	7	VFSL	0.6	6.1	0.2
Bmgj2	30	85	0	75	39	20	6	VFSL	0.3	6.1	0.2
Btgj1	46	74	1	61	41	28	12	VFSL	0.8	6.3	0.1
Btgj2	12	83	0	61	40	28	12	VFSL	0.2	6.3	0.2
Ckgj	21		1	65	37	29	6	VFSL		7.5	8.1

VINELAND SOIL - BROWN PHASE (VLD.B)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly brownish-hued lacustrine fine sandy loam and very fine sandy loam

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	20	23	1	69	35	22	9	VFSL	2.9	6.5	0.3
Bm	7	40	1	78	35	17	5	LFS	1.3	6.1	2.1
Bmgj1	18	57	0	77	41	17	6	LFS	0.8	6.4	0.4
Btgj	15	74	1	68	34	19	13	VFSL	0.4	6.4	0.0
Bmgj2	10	83	0	81	44	12	7	LFS	0.4	6.1	0.1
Ckgj	12		1	63	41	29	8	VFSL		7.6	14.5

VITTORIA SOIL (VIT)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over lacustrine silt loam

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	9	25	2	70	35	20	10	VFSL	2.9	6.2	0.3
Bmgj	8	53	2	70	33	23	7	VFSL	0.5	6.3	0.1
Btgj	6	67	0	64	34	24	12	VFSL	0.4	6.3	0.0
IICkgj	5		0	17	10	64	19	SIL		7.5	17.8

VITTORIA SOIL - RED PHASE (VIT.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over reddish-hued lacustrine silt loam

DRAINAGE Imperfect

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	12	26	2	69	28	22	9	VFSL	2.8	6.5	0.8
Bmgj	10	45	3	72	29	20	8	FSL	0.7	6.5	0.1
Btgj	9	60	3	63	20	23	14	FSL	0.3	6.6	0.2
IIBtgj	7	80	1	46	30	39	15	L	0.7	6.6	0.1
IICkg	7		1	34	22	56	10	SIL		7.7	12.5

WALSHER SOIL (WSH)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over lacustrine silt loam

DRAINAGE Well

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	18	5	63	31	28	9	VFSL	2.1	5.7	
Bm1	7	45	5	68	32	25	7	VFSL	0.7	5.7	
Bt	2	63	1	64	30	23	13	VFSL	0.5	6.6	
Bm2	6	77	6	64	22	29	7	FSL	0.3	5.7	
IIBm	4		2	34	22	51	15	SIL	0.2	5.8	

WAUSEON SOIL (WUS)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over lacustrine silty clay

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	16	3	58	20	26	16	FSL	3.4	6.2	0.3
Bmgj	5	41	3	77	27	14	9	FSL	0.8	6.5	0.0
IIBtg	2	68	1	8	0	42	50	SIC	0.5	7.1	0.6
IICkg	6		1	5	1	43	52	SIC		7.7	14.9

WELLAND SOIL (WLL)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine heavy clay

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	61	16	1	12	3	40	48	SIC	5.9	6.0	0.6
Bg1	63	39	0	7	2	32	61	HC	1.4	6.3	0.7
Bg2	21	56	0	8	2	30	62	HC	0.9	6.3	0.5
Ckg	56		0	3	0	31	66	HC	0.2	7.6	12.6

WELLAND SOIL - LOAMY PHASE (WLL.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued lacustrine heavy clay

DRAINAGE Poor

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	17	19	0	23	12	46	31	CL	4.6	6.0	0.2
IIBg1	10	43	0	8	2	34	58	C	1.0	6.3	0.0
IIBg2	5	46	0	11	5	30	59	C	0.8	6.3	1.4
IICkg	16		0	5	1	32	63	HC	1.1	7.7	14.0

Volume

2

The Soils of The Regional Municipality of Niagara

Volume 2

Ontario

Ministry of Agriculture and Food

David Ramsay, Minister

Agriculture Canada

Research Branch | Direction de la recherche

THE SOILS OF THE REGIONAL MUNICIPALITY OF NIAGARA

VOLUME 2

REPORT NO. 60
OF THE
ONTARIO INSTITUTE OF PEDOLOGY*

by

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Land Resource Research Centre Contribution No. 89-17

INTRODUCTION

Volume 2 consists mainly of detailed morphological, chemical and physical descriptions of selected typical soils of the Niagara Region. In addition, there are tables of statistical means and engineering test data. The analytical methods used to obtain chemical, physical and engineering test data are also briefly outlined.

Volume 1 contains descriptions of the environmental setting of the soils, generalized descriptions of the soils, and soil interpretations.

HOW TO USE THE SOIL MAPS AND REPORT

Resource managers, such as farmers or foresters, usually know the characteristics and variations of soils on their own properties or in the immediate vicinity. However, without a soil map and report, comparisons with other soils in the region is very difficult. With the help of a soil map, regional similarities, and differences between soils can be shown. This can be an aid in buying or renting land, or in transferring management techniques to similar soils, in order to reduce the risks of managing new land.

To use the soil maps and report most efficiently, the following procedure is suggested:

1. Locate the area of interest on the soil map index (Figure 1 in Volume 1). Note the number of the soil map on which your area of interest is located.
2. Obtain the appropriate soil map, and locate your specific area of interest. Natural and cultural features on the map, such as streams, contours, roads, buildings, lots and concessions should assist in location.
3. Note the map unit symbols within the map unit delineations that occur in your area of interest.
4. Consult the legend on the map to aid in understanding the symbol and determining the soil components, their slopes, parent materials and drainage.
5. If more information is required on the soil components, locate them by name in Volume 1 of the report. A generalized description of each soil is presented in Volume 1 as well as comments on land use and statistical means.
6. For specific soil interpretations, refer also to Volume 1. It contains soil capabilities for common agricultural field crops, soil suitability for special agricultural and horticultural crops and soil erosion interpretations.
7. For detailed soil profile descriptions, with associated chemical and physical analyses as well as engineering test data, users are referred to Volume 2.

Users should understand that each soil exhibits a range of properties, so that boundaries between different soils, even though they represent the best estimate of where soils change, may only be approximately located. Also, because of the map scale and the nature of the soil mapping, there could be inclusions within any map unit, up to several hectares in size of unidentified soil components. Most soils information is based on the examination of soil characteristics to a depth of about 100 cm below the surface.

ACKNOWLEDGEMENTS

Individuals involved in the detailed descriptions, statistical and laboratory analyses of the Niagara soils, have been acknowledged in Volume 1. All laboratory analyses, except for engineering test data, were provided by the Agriculture Canada laboratory, located at the Department of Land Resource Science, University of Guelph, Guelph.

Engineering test data was provided by the Soils and Aggregates Section Laboratory of the Highway Engineering Division of the Ontario Ministry of Transportation.

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SITE SELECTION, ANALYTICAL METHODS AND SOIL DESCRIPTIONS

A. Site Selection

The candidate soils for detailed descriptions were determined by the extent of the mapped soil and the number of sites of each soil sampled during the course of the mapping. Only the major soils were considered for detailed descriptions and in most cases only one site per soil was selected. Statistical means for properties such as pH, horizon thickness, texture, and depth to carbonates were generated for most horizons by computer from the data base. An attempt was made to locate and sample representative sites based on this data. Because there is considerable variability in soils, the sites described were representative if the soil properties were within the accepted range for that soil. Properties that were considered to be outside that range are indicated in the Status section of the detailed description.

B. Analytical Methods

Most of the methods used for soil analyses are outlined in the Manual on Soil Sampling and Methods of Analysis (1).

(I) The appropriate section numbers are indicated in parentheses after the soil analyses, as follows:
Particle size analysis by pipette method, after pretreatment (2.11)
pH $CaCl_2$ (3.11) pH water (3.13)
Organic carbon by wet oxidation, using ortho-phananthroline-ferrous sulfate as indicator (3.613)
Calcium carbonate equivalent, using 6N HCl and some glassware modifications (3.41)
Cation exchange capacity (3.34)
Electrical conductivity (4.12)
Bulk density by core method (2.21)
Water retention by pressure-plate extraction (2.43)
Shrinkage was determined by a modification that used the COLE rod method (2.13)

(II) Analytical methods not outlined in the above noted manual are:
Saturated hydraulic conductivity followed procedures used by U.S. salinity lab U.S.D.A. as outlined in (2)
Calcite-dolomite ratio determined by a gasometric procedure using the Chittick apparatus (3)
COLE rod method for determining shrinkage limit (4)
Engineering test data for selected soils of the Niagara Region are provided in Table 1. All tests, except for bulk density, porosity, free swell and COLE rod, were done by the Soils and Aggregates Section Laboratory, Highway Engineering Division, Ontario Ministry of Transportation, London, using American Society for Testing Materials (ASTM) methods (5). The test procedures and their ASTM numbers are as follows:
United classification D2487-69
AASHO classification D3282-73
Atterberg limits D423-4-72
Grain size analysis D422-72
Maximum dry density and percent optimum moisture D698-70
Free swell was determined from a method outlined by Holtz and Gibbs (6)
Volume of woody material and von Post Decomposition values, for organic soils, were estimated from guidelines outlined in the CanSIS manual for Describing Soils in the Field (7)

Table 1. Engineering test data for horizons of selected soils from the Niagara Region

Soil	Horizon	Depth cm	Soil Classification		Atterberg Limits			Mechanical Analysis					Bulk Dens.	Poro-sity	Compaction		Free Swell	Cole Rod
								% Passing			% Smaller Than				Max.Dry Dens.	Opt. Moist.		
			Unified	AASHO	LL%	PL%	PI%	#10	#40	#200	.05mm	.005mm	g/cc	%	t/m^3	%	%	
Alluvium 1	Ah	0-16	OH	A-7-6(16)	54.5	32.5	22	100	97	89	89	60	0.93	64	1.4	27.3	50	0.11
(1-ALU)	Bg	16-63	CI	A-7-6(15)	49.5	26.5	23	100	98	89	85	61	1.51	43	1.6	24.0	47	0.09
	IIAb	63-80	CI-CH	A-7-6(15)	50	27	23	90	85	76	76	53	1.14	57	1.7	22.2	62	0.12
	IICkg	80-100	CL	A-7-6(11)	34.5	18	16.5	89	85	78	74	51	1.65	41	1.9	15.7	37	0.07
Berrien	Ap	0-22	SM	A-4(3)	24	22.5	1.5	100	94	51	37	14	1.35	48	1.7	17.4	29	0.02
(BRR)	Bm	22-33	SM	A-4	NP	NP	NP	100	94	41	26	10	1.44	46	1.8	13.1	14	0.01
	Bmgj	33-44															9	0.00
	Btgj	44-60	SM-SC	A-4(4)	21.5	16	5.5	100	96	45	32	21	1.52	43	1.9	11.9	22	0.03
	IIBtg	60-77	CI	A-7-6(14)	47	22	25	100	99	90	86	67	1.51	43	1.6	22.1	63	0.06
	IICkg	77-95	CI	A-7-6(14)	47	22	25	100	100	96	93	78	1.59	41	1.6	23.2	56	0.07
Brooke	Ap	0-16	CH	A-7-6(10)	52	27.5	24.5	100	97	91	86	45	1.31	48	1.5	23.0	60	0.08
very shallow phase (BOK.V)	Bg	16-37	CL	A-6(13)	32	17	15	99	97	83	73	33	1.36	49	1.7	17.4	62	0.09
Chinguacousy	Ap	0-27	CL-CI	A-6(12)	35	20	15	97	94	84	78	38	1.25	52	1.7	18.0	41	0.06
(CGU)	Btgj	27-40	CI	A-7-6(12)	42	18.5	23.5	98	94	85	77	49	1.53	43	1.7	19.1	65	0.09
	Ckgj	40-100	CL	A-6(10)	32	16	16	95	92	83	78	50	1.69	37	1.8	15.3	50	0.08
Chinguacousy	Ap	0-14	CL	A-6(7)	33	21	12	91	82	64	57	24	1.07	59	1.7	17.2	32	0.03
red washed phase	Btgj1	14-30	CL	A-6(11)	32	15	17	98	94	81	75	46	1.73	35	1.8	17.4	40	0.06
(CGU.RW)	Btgj2	30-40	CI	A-6(13)	38.5	16	22.5	99	97	85	79	50	1.63	37	1.7	18.5	47	0.09
	Bmgj	40-66	CL	A-6(11)	32.5	15.5	17	98	96	83	75	37	1.69	36	1.8	15.6	40	0.08
	Ckgj	66-100	CL	A-4(8)	24.5	14.5	10	97	96	86	77	30	1.87	31	2.0	12.8	49	0.03
Colwood	Ap	0-23	OI	A-5(8)	41.5	33.5	8	100	98	87	74	27	1.06	57	1.4	25.4	34	0.07
(CWO)	Bg	23-35	CL	A-4(8)	23.5	15	8.5	100	100	89	75	32	1.69	37	1.9	14.2	15	0.05
	Ckgj1	35-52	ML	A-4(8)	16.5	12.5	4	100	100	80	57	20	1.64	40	2.0	11.6	13	0.03
	Ckgj2	52-80	CL	A-4(8)	23	15	8	100	100	91	75	32	1.55	42	1.9	13.8	20	0.07
	Ckg	80-100	CL-ML	A-4(8)	23.3	16.5	6.8	100	100	97	86	28	1.53	44	1.9	14.6	7	0.04

Soil	Horizon	Depth	Soil Classification		Atterberg Limits			Mechanical Analysis					Bulk Dens.	Poro-sity	Compaction		Free Swell	Cole Rod
								% Passing			% Smaller Than				Max.Dry Dens.	Opt. Moist.		
			Unified	AASHO	LL%	PL%	PI%	#10	#40	#200	.05mm	.005mm	g/cc	%	t/m^3	%	%	
Farmington	Ap	0-11	OI	A-5(9)	42	36	6	98	97	87	73	14	1.01	60	1.3	29.4	24	0.05
very shallow phase	Bm	11-24	OL	A-4(8)	NP	NP	NP	89	88	78	67	16	1.05	58	1.5	26.1	23	0.05
(FRM.V)																		
Fonthill	Ap	0-21	SM	A-4(3)	25	22	3	87	63	37	31	11	1.35	49	1.9	12.7	19	0.01
(FNT)	Bm1	21-54	SM	A-4(1)	17.5	17	0.5	91	57	31	26	10	1.47	45	2.0	9.7	19	0.00
	Bm2	54-74	SM	A-4(1)	19	17	2	91	44	24	20	9	1.43	47	2.0	11.2	11	0.01
	Bm3	74-100	SM	A-4	13.5	11.9	1.6	96	43	26	23	8	1.35	50	1.9	12.8	6	0.01
Fox	Ah	0-10	SM	A-4(1)	NP	NP	NP	100	93	38	35	12	0.86	67	1.5	19.2	11	0.04
red phase	Bm	10-38	SM	A-2	NP	NP	NP	100	91	35	32	11	1.10	59	1.8	14.2	8	0.02
(FOX.R)	Bt	38-66	SM	A-2	NP	NP	NP	100	92	31	25	12	1.09	59	1.9	11.1	9	0.01
	Btj	66-100	SM	A-2	NP	NP	NP	100	89	26	24	12	1.33	51	2.0	10.4	7	0.00
Grimsby	Ap	0-23	SM	A-4(8)	NP	NP	NP	100	97	45	30	9	1.17	56	1.7	14.2	5	0.00
(GMY)	Bm1	23-60	SM	A-2-4(8)	NP	NP	NP	100	98	27	20	9	1.37	49	1.8	12.1	9	0.00
	Bt1	60-95	SM	A-4(8)	NP	NP	NP	100	99	45	28	12	1.43	47	1.8	13.7	4	0.01
	Bt2	95-115	ML	A-4(8)	24	23	1	100	100	84	50	14	1.38	49	1.8	13.9	10	0.00
Haldimand	Ap	0-15	OI-OH	A-7-6(14)	50	29.5	20.5	100	99	93	92	65	1.05	59	1.5	27.4	56	0.08
(HIM)	Btgj1	15-25	CH	A-7-6(18)	55	27	28	100	99	97	97	83	1.27	53	1.5	28.6	80	0.12
	Btgj2	25-38	CH	A-7-6(20)	62	26	36	100	100	99	97	86	1.30	51	1.5	28.3	70	0.12
	Ckgj	38-80	CH	A-7-6(17)	51.5	24	27.5	100	100	99	97	89	1.35	50	1.6	26.1	60	0.12
Haldimand	Ap	0-17	CI	A-6(14)	40	24	16	100	99	93	87	48	1.36	47	1.6	22.5	40	0.05
loamy phase	IIBtgj1	17-28	CH	A-7-6(17)	56.5	24.5	32	100	100	97	92	76	1.51	42	1.5	23.0	71	0.09
(HIM.L)	IIBtgj2	28-42	CH	A-7-6(17)	57	24	33	100	100	99	95	77	1.46	44	1.5	21.4	80	0.09
	IICkgj	42-100	CI	A-7-6(14)	44.5	23.5	21	100	100	98	95	77	1.46	45	1.6	22.1	69	0.08
Jeddo	Ap	0-19	CI	A-6(13)	39	23.5	15.5	99	94	84	71	34	1.29	50	1.6	22.1	31	0.05
washed phase	Bg	19-49	CL	A-6(11)	34.5	17	17.5	97	92	83	66	33	1.56	42	1.7	16.5	40	0.05
(JDD.W)	Ckg	49-100	CL	A-6(10)	26.5	15.5	11	96	91	79	73	36			1.9	14.6	37	0.04
Lincoln	Ap	0-15	CH	A-7-6(11)	52	27.5	24.5	100	97	89	87	62	1.22	52	1.5	27.4	77	0.09
(LIC)	Btg1	15-34	CH	A-7-6(18)	61.5	25	36.5	100	100	98	97	80	1.49	44	1.6	26.4	90	0.08
	Btg2	34-62	CH	A-7-6(16)	51.5	24	27.5	100	100	95	94	76	1.49	44	1.6	21.7	73	0.08
	Ckg	62-100	CI	A-7-6(15)	48.5	22	26.5	100	100	99	97	83	1.51	44	1.6	23.1	57	0.09

Soil	Horizon	Depth cm	Soil Classification		Atterberg Limits			Mechanical Analysis					Bulk Dens.	Poro- sity	Compaction Max.Dry Dens.	Compaction Opt. Moist.	Free Swell	Cole Rod
								% Passing			% Smaller Than							
			Unified	AASHO	LL%	PL%	PI%	#10	#40	#200	.05mm	.005mm	g/cc	%	t/m^3	%	%	
Malton	Ap	0-26	CI	A-7-6(14)	41	24	17	100	100	96	90	42	1.24	51	1.5	24.4	50	0.06
(MAT)	Bg	26-50	CI	A-7-6(14)	46.5	20.5	26	100	100	99	98	58	1.43	46	1.6	20.5	70	0.06
	Ckg	50-85	CI	A-6(11)	39	16.5	22.5	100	100	99	96	64	1.53	43	1.7	20.2	60	0.07
	IICkg	85-100	CI	A-6(12)	39	19	20	90	84	75	72	52	1.52	44	1.8	17.4	61	0.07
Malton	Ap	0-19	OH	A-7-5(18)	51	32.5	18.5	99	98	88	84	42	0.97	61	1.4	26.6	58	0.08
red phase	Bg	19-43	CI	A-7-6(12)	42	18	24	99	98	91	85	56	1.44	46	1.7	19.8	71	0.08
(MAT.R)	Ckg	43-87	CL	A-6(11)	34	16.5	17.5	96	95	90	84	55	1.62	39	1.8	15.5	68	0.06
	IICkg	87-100											1.50	44			53	0.05
Maplewood	Ah	0-20	OH	A-5(12)	61	51	10	100	94	81	73	26	0.72	72	1.2	36.0	40	0.12
(MPW)	Aegj	20-39											1.42	47			10	0.04
	Btg	39-50	CL	A-6(10)	33	17	16	100	98	91	82	39	1.50	28	1.8	17.9	40	0.12
	Bg	50-59											1.51	43			30	0.07
	IIBg	59-89	CI	A-6(11)	36	18.5	17.5	100	99	97	93	37	1.51	45	1.8	16.9	30	0.08
	IICkg	89-100	CI	A-7-6(14)	43.5	19.5	24	100	100	98	90	64	1.42	48	1.6	22.7	50	0.06
Niagara	Ap	0-17	ML	A-7-5(12)	47.2	31.6	15.6	99	99	94	88	38	0.95	63	1.5	26.8	20	0.07
loamy phase	IIBtgj	17-39	CL	A-7-6(11)	41.6	24.8	16.8	100	100	97	94	60	1.28	50	1.6	23.9	40	0.11
(NGR.L)	IIBt	39-53	CI	A-7-6(18)	49	18.5	30.5	100	99	97	91	68	1.45	45	1.6	23.3	50	0.10
	IICk	53-100	CL	A-7-6(15)	49.1	25.9	23.2	100	99	97	93	72	1.45	45	1.6	23.0	50	0.08
Plainfield	Ah	0-14	SP-SM	A-3	NP	NP	NP	100	96	10	9	3	0.92	63	1.5	20.7	9	0.03
dune phase	Bm1	14-26															5	0.00
(PFD.D)	Bm2	26-41	SP	A-3	NP	NP	NP	100	95	2	2	1	1.27	52	1.7	15.0	7	0.02
	Bm3	41-67	SP	A-3	NP	NP	NP	100	94	2	2	2	1.33	50	1.7	15.0	4	0.00
	Bm4	67-105	SP	A-3	NP	NP	NP	100	93	2	2	2	1.26	53	1.7	15.3	9	0.00
	Ck	105-125	SP	A-3	NP	NP	NP	100	96	3	3	2	1.30	51	1.6	20.1	8	0.01
Tavistock	Ap	0-24	CL	A-4(12)	27.5	21	6.5	100	99	84	74	26	1.23	52	1.6	19.8	29	0.05
(TVK)	Bmgj	24-40	ML	A-4(12)	20.8	19	1.8	100	99	84	74	23	1.27	52	1.8	15.5	21	0.02
	Btgj1	40-54	CL	A-6(10)	33	15.3	17.7	100	99	87	76	37	1.46	46	1.7	16.4	40	0.05
	Btgj2	54-65						100	100	90	81	35	1.40	48	1.8	17.3	36	0.05
	IIBg	65-70															51	0.07
	IICkg	70-100	CI	A-7-6(14)	46	22.5	23.5	100	100	98	97	80	1.47	46	1.6	23.4	56	0.07

Soil	Horizon	Depth cm	Soil Classification		Atterberg Limits			Mechanical Analysis					Bulk Dens.	Poro-sity	Compaction Max.Dry Dens.	Compaction Opt. Moist.	Free Swell	Cole Rod
								% Passing			% Smaller Than							
			Unified	AASHO	LL%	PL%	PI%	#10	#40	#200	.05mm	.005mm	g/cc	%	t/m^3	%	%	
Tavistock	Ap	0-27	CL-ML	A-4(8)	27.5	22.5	5.0	99	95	74	60	21	1.22	53	1.7	18.6	20	0.04
(TVK)	Bmgj	27-47	SP-SM	A-4(4)	NP	NP	NP	100	96	54	35	10	1.57	39	1.8	12.5	20	
	Btgj	47-54											1.68	39			30	0.04
	IIBtgj	54-74	CI	A-6(12)	35.5	16.5	19	100	99	91	84	45	1.69	42	1.8	17.8	40	0.10
	IICkgj	74-100	CI	A-6(11)	36	19	17	99	98	95	91	56	1.74	37	1.8	19.2	50	0.05
Toledo	Ap	0-29	OI	A-7-5(9)	46	35.5	10.5	100	98	95	85	43	0.90	64	1.4	27.1	31	0.10
(TLD)	Bg1	29-41	CI	A-7-6(16)	46.5	21	25.5	100	100	98	90	54	1.40	47	1.7	20.9	56	0.13
	Bg2	41-55	CI	A-7-6(16)	46.5	21	25.5	100	100	98	90	54	1.57	43	1.7	20.9	60	0.12
	Ckg	55-100	CI	A-7-6(15)	45.5	20.5	25	100	100	98	94	66	1.52	45	1.7	21.8	48	0.10
Toledo	Ap	0-18	CI	A-7-6(15)	44	25.5	18.5	100	100	98	90	45	1.18	53	1.5	22.1	51	0.08
red phase	Aeg	18-31	CI	A-7-6(15)	49.5	22.5	27	100	100	98	94	57	1.56	41	1.6	22.4	65	0.08
(TLD.R)	Btg	31-46	CI	A-7-6(14)	49.5	21	28.5	100	100	97	91	65	1.59	40	1.6	22.0	70	0.09
	Ckg	46-100	CI	A-7-6(13)	43.5	21.5	22	100	100	98	93	70	1.58	42	1.7	21.5	52	0.06
Trafalgar	Ap	0-15	CL	A-6(9)	33	21.5	11.5	100	95	89	83	33	1.46	45	1.7	17.7	22	0.03
shallow phase	Bmgj	15-34	CL	A-4(8)	28.5	19	9.5	100	87	78	73	30	1.44	46	1.8	15.5	29	0.02
(TFG.S)	Btgj1	34-45	CL	A-6(8)	30	19	11	100	94	86	83	42	1.49	44	1.8	17.5	22	0.05
	Btgj2	45-83	CI	A-6(11)	37	20	17	100	100	97	96	62	1.76	36	1.7	18.9	61	0.07
Tuscola	Ap	0-19	ML	A-4(15)	29	26.5	2.5	100	100	81	55	10	0.97	62	1.6	21.0	24	0.02
red phase	Bm	19-41	ML	A-4	NP	NP	NP	100	100	85	61	6	1.21	53	1.7	17.7	16	0.01
(TUC.R)	Btgj	41-57	ML	A-4(13)	23.5	22	1.5	100	100	98	80	18	1.45	45	1.8	15.8	25	0.01
	Bmgj1	57-74	ML	A-4(13)	23	21.5	1.5	100	100	96	85	11	1.43	46	1.7	16.3	29	0.00
	Bmgj2	74-90	ML	A-4	NP	NP	NP	100	100	96	81	12	1.39	50	1.7	15.6	18	0.00
	Bmgj3	90-100	ML	A-4	NP	NP	NP	100	100	94	74	7	1.40	47	1.7	16.0	13	0.00
Vineland	Ap	0-21	ML	A-4(8)	NP	NP	NP	99	97	75	57	12	1.28	51	1.6	17.4	14	0.11
(VLD)	Bmgj1	21-36	ML	A-4(8)	NP	NP	NP	99	98	81	63	10	1.10	59	1.7	14.2	15	0.02
	Bmgj2	36-47	ML	A-4(8)	NP	NP	NP	99	98	81	63	10	1.28	52	1.7	14.2	9	0.00
	Btgj	47-57	ML	A-4(8)	23.5	23	0.5	100	99	92	65	15	1.40	47	1.7	15.1	20	0.01
	Bmgj3	57-84	ML	A-4(8)	24.5	22	2.5	100	100	91	52	12	1.47	43	1.7	16.0	8	0.03
	Bmgj4	84-100	ML	A-4(8)	24.5	22	2.5	100	100	91	52	12	1.43	47	1.7	16.0	2	0.01
Welland	Ap	0-15	OI	A-7-6(17)	45.5	27.5	18	100	100	95	90	57	1.16	55	1.5	26.2	44	0.07
(WLL)	Btg1	15-34	CH	A-7-6(20)	62	26	36	100	100	98	94	76	1.40	47	1.6	26.0	78	0.09
	Btg2	34-43											1.42	47			88	0.10
	Ckg	43-75	CH	A-7-6(19)	56	27.5	28.5	100	100	99	97	90	1.42	47	1.5	24.7	63	0.03

C. Soil Descriptions and Analyses

The format used to characterize each selected soil, is to provide a generalized summary of soil parent materials, drainage and classification, followed by a table of mean horizon values. The mean values were obtained from laboratory analyses of all soil horizons that were sampled.

Following this generalized soil information, are detailed soil profile descriptions, where available, of typical profiles. The taxonomic classifications and nomenclature used for typical profile descriptions, were those of the Canadian System of Soil Classification (8). Criteria for texture, structure, consistence and mottles are from the CanSIS Manual (7), and colour is from the Munsell charts (9). In addition to site and horizon properties, tables of chemical and physical properties of soil horizons are given for each typical soil profile.

In some instances, no data or blanks appear in the tables because the sample was not analyzed. This happened for various reasons. For example, CEC was not reported for the C horizons because the results were too variable and dependent on the measurement techniques. Organic matter was not usually determined for C horizons because the values are generally low. Similarily, the carbonate content was not usually measured in the A and B horizons when the pH values of these horizons were less than 7.0, because the amounts are generally negligible.

The definitions of soil texture abbreviations used in the tables, are as follows:

GR - Gravel
GL - Gravelly loam
GS - Gravelly sand
CS - Coarse sand
S - Sand
FS - Fine sand
VFS-Very fine sand
LCS - Loamy coarse sand
LS - Loamy sand
LFS-Loamy fine sand
LVFS - Loamy very fine sand
CSL - Coarse sandy loam
SL - Sandy loam
FSL - Fine sandy loam
VFSL - Very fine sandy loam
L - Loam
SIL - Silt loam
SCL - Sandy clay loam
FSCL - Fine sandy clay loam
VFSCL - Very fine sandy clay loam
CL - Clay loam
SICL - Silty clay loam
SC - Sandy clay
SIC - Silty clay
C - Clay
HC - Heavy clay
ORG - Organics

ALLUVIUM

ALLUVIUM 1 (1-ALU)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Variable floodplain deposits on an active floodplain

DRAINAGE Variable

USUAL CLASSIFICATION Variable

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	20	0	14	4	50	36	SICL	5.0	6.2	0.0
Bg1	8	50	0	12	4	49	39	SICL	2.0	6.0	0.1
Bg2	7	75	1	13	3	44	43	SIC	1.6	6.4	0.2
Ckg	3		2	8	1	41	51	SIC		7.6	11.6

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

1-ALU ONTARIO 1985 PROFILE NO.LWSSP003

LOCATION Township of West Lincoln, Lot 31, Con. VI, NTS Map Area 30M/4a, 17 TPT 1875 6990

ELEVATION 186 metres

SITE Pasture field

LANDFORM AND PARENT MATERIALS Floodplain

SLOPE 2% complex

SOIL WATER REGIME Poorly drained, conductivity low, saturation period long to prolonged

STONINESS Nonstony

CLASSIFICATION Orthic Humic Gleysol, fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Undecided

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ah	0-16 (13-18)	2.5YR4/2m	SIC	moderate to strong, coarse, granular	moderate to strong, medium to coarse, granular	sticky, firm, very plastic	
Bg	16-63 (47-52)	2.5Y5/2m	SIC	moderate to strong, coarse, columnar	moderate to strong, medium to coarse, columnar	sticky, very firm, very plastic	many, fine, prominent, 10YR5/6
IIABg	63-80 (9-18)	10YR3/1m	C	weak, coarse, subangular blocky	weak, coarse, subangular blocky	sticky, firm, plastic	many, fine, prominent, 5YR4/6
IICkg	80+	7.5YR4/2m	SICL	moderate to strong, coarse, subangular blocky	moderate to strong, medium to coarse, subangular blocky	sticky, very firm, very plastic	many, medium, prominent, 10YR4/6

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm³	Porosity %
Ah	0- 16	0	0	1	2	3	4	10	46	44	19	0.93	64
Bg	16- 63	0	0	2	3	4	3	12	46	42	17	1.51	43
IIBg	63- 80	1	3	2	3	3	3	14	36	51	22	1.14	57
IICkg	80+	8	4	2	2	3	8	18	50	32	8	1.65	41

Horizon	Depth cm	% Moisture Retention (g/g) 0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ah	0- 16	70.3	43.7	39.7	17.7	22.0	2.70		6.6	6.5	3.9	28.4		
Bg	16- 63	54.0	45.3	41.3	24.7	16.6	0.11		6.7	6.4	2.7	22.2		
IIBg	63- 80	61.0	51.3	48.0	24.7	23.3	10.60		7.1	6.7	4.0	38.6		
IICkg	80+	47.3	37.0	33.7	26.7	7.0	0.53	0.3	7.7	7.7			24.0	0.7

ALLUVIUM 2 (2-ALU)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly coarse-textured sandy floodplain deposits

DRAINAGE Variable

USUAL CLASSIFICATION Variable

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	25	2	56	19	30	14	FSL	2.4	4.8	
Btgj	1	45	3	60	22	34	6	FSL	0.8	5.4	
Bm	1	100	3	70	23	26	4	FSL		5.4	

ALLUVIUM 3 (3-ALU)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly medium-textured loamy floodplain deposits

DRAINAGE Variable

USUAL CLASSIFICATION Variable

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	7	22	1	17	6	59	24	SIL	4.3	6.7	
Bmgj	5	57	0	17	8	64	19	SIL	0.8	6.8	
Btgj	2	70	0	10	4	61	29	SICL	1.0	6.0	
Ckgj	3		5	19	9	71	10	SIL	0.2	7.7	15.3

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

3-ALU ONTARIO 1985 PROFILE NO. LWSP010

LOCATION	Township of West Lincoln, Lot 13, Con. IX, NTS Map Area 30M/4a, 17 TPT 1615 7391
ELEVATION	189 metres
SITE	Apple orchard
LANDFORM AND PARENT MATERIALS	Very gently sloping floodplain terrace; dominantly loamy soil materials
SLOPE	1.5% simple
SOIL WATER REGIME	Imperfectly drained
STONINESS	Nonstony
CLASSIFICATION	Gleyed Brunisolic Gray Brown Luvisol, loamy, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Undecided

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-20 (20-22)	10YR3/2m	SIL	weak, medium, subangular blocky	moderate, fine to medium, granular	very friable, very plastic	
Btgj	20-44 (22-26)	10YR4.5/3m	SIL	weak to moderate, medium, subangular blocky	weak to moderate, fine to medium, subangular blocky	friable, very plastic	many, fine, prominent, 10YR4/6
Bmgj	44-52 (6-16)	10YR5/3m	SIL	very weak, medium, platy	very weak, medium platy	friable, slightly plastic	many, fine, prominent, 10YR4/6
Ckgj	52-76 (14-32)	10YR5/3m	SIL	very weak, coarse, subangular blocky	very weak, medium to coarse, subangular blocky	friable, slightly plastic	many, fine, prominent, 10YR4/6
Ckg	76+	2.5Y5/2m	SIL	very weak, coarse, subangular blocky	very weak, coarse, subangular blocky	friable, slightly plastic	many, fine, prominent, 10YR4/6

			Sand Fraction %							
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 20	0						10	70	19
Btgj	20- 44	0						9	68	23
Bmgj	44- 52	0	0	0	1	1	20	22	63	15
Ckgj	52- 76	7	3	2	1	1	19	27	63	10
Ckg	76+	6	10	1	1	2	8	21	69	10

Horizon	Depth cm	Bulk Density g/cm³	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 20	1.26	6.9	3.0	19.2			
Btgj	20- 44	1.37	6.8	0.8	13.2			
Bmgj	44- 52	1.36	7.1	0.6	14.9			
Ckgj	52- 76	1.44	7.6		19.9	10.0	2.2	0.1
Ckg	76+	1.50	7.7			17.0	3.1	0.1

ALLUVIUM 4 (4-ALU)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly fine-textured clayey floodplain deposits

DRAINAGE Variable

USUAL CLASSIFICATION Variable

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	7	24	0	8	0	44	48	SIC	5.1	6.3	
Bg1	8	48	0	8	1	47	45	SIC	2.2	6.2	
Bg2	8	79	0	8	3	46	46	SIC	1.3	6.4	
Bg3	4		0	16	5	47	37	SICL	0.6	6.4	

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

4-ALU ONTARIO 1985 PROFILE NO.EWPP008

LOCATION Township of West Lincoln, Lot 13, Con. IX, NTS Map Area 30M/4a, 17 TPT 1600 7380

ELEVATION 191 metres

SITE Pasture field

LANDFORM AND PARENT MATERIALS Very gently sloping floodplain terrace; dominantly silty clay sediments

SLOPE 1% simple

SOIL WATER REGIME Poorly drained, conductivity low, saturation period long to prolonged

STONINESS Nonstony

CLASSIFICATION Orthic Humic Gleysol, fine clayey, mild humid to subhumid

STATUS Undecided

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap1	0-24 (23-25)	10YR3/2m	SIC	weak, coarse, subangular blocky	weak, medium, subangular blocky	slightly sticky, hard, very plastic	
Ap2	24-38 (10-14)	10YR3/2m	SIC	moderate, medium to coarse, subangular blocky	moderate, fine to medium, subangular blocky	sticky, hard, very plastic	
Bg1	38-69 (30-40)	10YR4/2m	SICL	moderate to strong, very coarse, subangular blocky	moderate to strong, coarse, subangular blocky	sticky, very hard, very plastic	common, fine, distinct and prominent, 10YR4/6
Bg2	69+	10YR5/2m	SIC	moderate, coarse, angular blocky	weak to moderate, medium, angular blocky	slightly sticky, very hard, very plastic	common, medium, prominent, 10YR5/6

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap1	0- 24	0						10	44	46
Ap2	24- 38	0						9	52	40
Bg1	38- 69	0						10	55	35
Bg2	69+	0						4	53	43

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap1	0- 24	1.02	7.0	6.3	33.8	1.0		
Ap2	24- 38	1.24	6.6	2.6	29.6			
Bg1	38- 69	1.33	6.8	1.4	25.4			
Bg2	69+	1.52	7.2	1.0	25.9	1.0		

BENNINGTON SOIL (BNG)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over lacustrine silty clay

DRAINAGE Well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	27	2	47	33	40	13	L	2.2	6.3	0.8
Bm	5	40	0	40	33	45	15	L	2.1	5.8	0.1
Bt1	4	61	0	38	31	38	24	L	0.5	6.5	0.4
Bt2	3	65	0	25	18	55	20	SIL	1.2	4.9	0.0
IIBt	4	86	0	6	0	48	46	SIC	0.6	5.6	0.0
IICk	2		0	4	0	58	38	SICL		7.6	12.4

BENNINGTON SOIL - HEAVY PHASE (BNG.H)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over lacustrine heavy clay

DRAINAGE Well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	27	1	55	28	31	14	VFSL	3.3	5.5	0.0
Bm	1	50	1	62	37	32	6	VFSL	0.7	5.6	0.0
Bt	1	65	3	65	33	24	11	VFSL	6.1	0.5	0.0
IIBt	1	83	1	11	7	34	55	C	0.4	7.0	0.5
IICkgj	1		0	4	0	27	69	HC		7.6	11.5

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps

BENNINGTON SOIL - RED PHASE (BNG.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued loamy textures over lacustrine silty clay

DRAINAGE Well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	20	1	75	42	18	7	SL	2.4	6.8	
Bm	1	35	0	71	49	23	6	SL	0.6	6.7	
Btj	2	58	1	76	43	16	8	SL	0.3	6.7	
BC	1	76	0	14	11	71	15	SIL	0.4	7.2	1.4
IICkgj	1		3	10	6	56	34	SICL		7.6	13.8

BENNINGTON SOIL - TILL PHASE (BNG.T)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over clay loam till

DRAINAGE Well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	2	15	3	28	10	51	21	SIL	3.9	6.4	
Bm	3	40	2	32	11	50	18	SIL	1.1	5.9	
Bt	1	60	2	24	8	47	29	CL	0.7	6.4	
IIBt	1	70	0	14	5	52	34	SICL	0.4	7.4	1.0
IICk	2		3	20	6	46	34	SICL		7.2	6.5

BENNINGTON SOIL - WASHED TILL PHASE (BNG.WT)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over washed clay loam till, modified by lacustrine processes

DRAINAGE Well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	7	1	49	18	35	16	L	3.2	5.8	
Bm	1	43	0	66	60	25	9	VFSL	0.2	5.9	
Bmgj	1	84	0	69	63	25	6	VFSL	0.1	6.4	
IICk	1		7	38	16	41	21	L		7.6	6.6

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps

BERRIEN SOIL (BRR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over lacustrine silty clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	10	19	0	66	29	23	11	VFSL	2.9	6.0	
Bmgj	9	43	0	74	34	17	9	VFSL	0.8	6.3	
Aegj	7	44	0	76	33	18	6	VFSL	0.4	5.8	
Btgj	6	60	0	60	25	22	18	VFSL	0.4	6.5	
IIBtgj	5	79	1	12	3	39	49	C	1.3	6.7	
IICkg	11		0	8	2	46	46	SIC		7.6	11.9

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

BRR ONTARIO 1985 PROFILE NO.MEFSP010

LOCATION Town of Thorold, Lot 207, NTS Map Area 30M/3b , 17 TPT 4405 6722

ELEVATION 180 metres

SITE Cropland

LANDFORM AND PARENT MATERIALS Nearly level to gently sloping, dissected lacustrine clay plain overlain by loamy and sandy sediments of variable thickness

SLOPE 5% complex

SOIL WATER REGIME Imperfectly drained, conductivity high to medium in sands, low in clays, saturation period short to medium

STONINESS Nonstony

CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol, coarse loamy/clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Modal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-22 (19-22)	10YR4/3m	FSL	moderate, medium, granular	strong, medium, granular	nonsticky, very friable, slightly plastic	
Bm	22-33 (11-15)	10YR5/6m	LFS	single grain	single grain	nonsticky, loose, nonplastic	
Bmgj	33-44 (8-11)	10YR5/6m	LFS	single grain	single grain	nonsticky, very friable, nonplastic	common, fine, distinct, 10YR5/8
Btgj	44-60 (16-22)	7.5YR4/4m	VFSL	moderate, coarse, platy	weak to moderate, coarse, platy	nonsticky, very firm, slightly plastic	common, fine, distinct, 7.5YR4/6
IIBtg	60-77 (14-21)	10YR5/1m	C	weak, coarse, columnar	weak, coarse, subangular blocky	very sticky, very firm, very plastic	common, fine, prominent, 10YR5/4
IICkg	77+	10YR5/1m	SIC	weak, coarse, columnar	weak to moderate, coarse, subangular blocky	very sticky, very firm, very plastic	common, fine, prominent, 10YR5/4

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm³	Porosity %
Ap	0- 22	0	1	3	14	24	24	66	25	9	3	1.35	48
Bm	22- 33	0	0	3	14	33	32	82	14	4	2	1.44	46
Bmgj	33- 44	0	0	3	13	36	28	80	13	7	2		
Btgj	44- 60	0	0	2	10	26	29	67	16	17	9	1.52	43
IIBtg	60- 77	0	0	1	3	9	10	23	36	41	13	1.51	43
IICkg	77+	0						4	41	56	11	1.59	41

Horizon	Depth cm	% Moisture Retention (g/g) 0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 22	54.3	33.3	21.7	7.3	14.4	1.90		5.8	5.7	2.6	8.9		
Bm	22- 33	51.3	33.3	19.7	7.7	12.0	7.80		6.5	5.6	0.4	6.9		
Bmgj	33- 44								6.6	5.7	0.3	7.5		
Btgj	44- 60	53.7	33.0	19.3	8.7	10.6	0.42		7.0	6.2	0.3	11.1		
IIBtg	60- 77	59.0	48.0	42.7	29.0	13.7			7.5	6.8	4.3	17.4		
IICkg	77+	58.3	48.7	44.0	31.3	12.7		0.2	7.9	7.5			14.0	4.4

BERRIEN SOIL - HEAVY PHASE (BRR.H)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over lacustrine heavy clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	27	6	54	18	30	16	FSL	2.8	5.9	
Bmgj	7	58	4	55	19	30	14	FSL	0.8	6.2	
IIBtgj	2	67	1	14	2	27	60	HC	0.6	7.0	
IICkgj	4		2	6	0	26	69	HC	7.5	9.8	

BERRIEN SOIL - RED PHASE (BRR.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued sandy textures over lacustrine silty clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	19	5	73	20	18	9	FSL	2.3	6.0	
Bmgj	4	42	4	73	24	18	9	FSL	0.5	6.3	
Btgj	3	54	0	66	23	19	15	FSL	0.4	6.2	
IICkg	4		2	10	3	48	42	SIC	0.1	7.5	13.8

BERRIEN SOIL - TILL PHASE (BRR.T)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over clay loam till

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	12	24	3	66	20	23	11	FSL	2.6	6.3	0.5
Bmgj	9	51	4	77	21	16	7	FSL	0.6	6.1	0.1
IIBtgj	4	63	12	39	12	34	27	CL	0.4	6.7	0.3
IIBm	7	66	9	61	13	24	15	FSL	0.3	6.9	2.7
IICkg	8		5	22	10	51	27	CL		7.5	9.3

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

BRR.T ONTARIO 1985 PROFILE NO.EAWP013

LOCATION Town of Niagara-on-the-Lake, Lot 154, NTS Map Area 30M/3g, 17 TPT 5081 8477

ELEVATION 95 metres

SITE Cultivated winter wheat field

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping clay till plain overlain by discontinuous areas of loamy and sandy sediments of variable thicknesses

SLOPE 2.5% complex

SOIL WATER REGIME Imperfectly drained, conductivity high to medium in sands, low in clays, saturation period short to medium

STONINESS Slightly stony

CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol, sandy/loamy, alkaline, weakly calcareous, mild humid to subhumid

STATUS Modal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-29 (25-30)	10YR4/4m	FSL	very weak, medium to coarse, subangular blocky	weak, medium to coarse, subangular blocky	nonsticky, friable, nonplastic	
Bmgj	29-64 (30-37)	10YR7/4m	LFS	very weak, medium to coarse, subangular blocky	weak, medium to coarse, subangular blocky	nonsticky, friable, nonplastic	many, medium, prominent, 7.5YR4/6
IIBtg	64-74 (10-14)	10YR5/2m	CL	moderate, medium to coarse, columnar	moderate to strong, coarse, angular blocky	slightly sticky, very firm, plastic	many, medium, prominent, 10YR5/5
IICkg	74+	10YR5/2m	CL	moderate, medium to coarse, columnar	moderate to strong, coarse, angular blocky	slightly sticky, very firm, plastic	many, medium, prominent, 10YR5/6

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 29	1	4	2	5	34	25	70	20	10
Bmgj	29- 64	0	3	3	6	41	32	86	9	5
IIBg	64- 74	2	3	3	4	7	8	24	49	28
IICkg	74+	5	2	2	3	6	8	20	52	29

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 29	1.26	7.3	1.5	10.7	1.0		
Bmgj	29- 64	1.36	7.2	0.1	10.7	1.0		
IIBg	64- 74	1.64	7.3	0.1	14.4	0.0		
IICkg	74+	1.72	7.6		54.2	5.0	1.5	0.2

BEVERLY SOIL (BVY)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine silty clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	93	17	0	14	6	52	34	SICL	3.6	6.2	0.3
Bmgj	22	42	0	10	4	51	39	SICL	1.4	6.3	0.4
Btgj	84	45	0	7	1	45	48	SIC	1.1	6.3	0.4
Ckgj	76		0	5	1	46	49	SIC	0.1	7.6	14.1

BEVERLY SOIL - COARSE PHASE (BVY.C)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm sandy textures over lacustrine silty clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Apk	1	12	0	65	29	21	14	FSL	3.4	7.6	9.8
Bmgjk	1	22	0	77	34	14	9	FSL	2.1	7.5	12.8
Btgjk	1	34	0	52	22	34	14	FSL	1.0	7.7	16.4
IICkgj	1	45	0	4	0	53	43	SIC		7.7	23.9
IICkg	1		0	1	0	54	45	SIC		7.7	28.1

BEVERLY SOIL - LOAMY PHASE (BVY.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over lacustrine silty clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	75	19	1	25	15	51	24	SIL	3.7	6.2	0.4
Bmgj	31	33	1	30	18	47	23	L	1.4	6.1	0.2
IIBtgj	73	50	0	12	6	44	44	SIC	0.9	6.4	0.2
IICkgj	74		0	7	2	49	44	SIC	0.0	7.5	14.5

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

(1)BVY.L ONTARIO 1985 PROFILE NO.EAWP018

LOCATION	City of St. Catharines, Lot 1, Con. VI, NTS Map Area 30M/3f, 17 TPT 4062 7720
ELEVATION	116 metres
SITE	Abandoned farmland
LANDFORM AND PARENT MATERIALS	Nearly level till plain composed of variable depths of loamy or clayey lacustrine sediments
SLOPE	1.5% simple
SOIL WATER REGIME	Imperfectly drained, conductivity low, saturation period medium
STONINESS	Nonstony
CLASSIFICATION	Gleyed Brunisolic Gray Brown Luvisol, fine loamy over fine clayey, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Modal. Ck horizon has lower clay content than normal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-17 (17-18)	10YR4/3m	SIL	moderate, coarse, granular	moderate to strong, medium to coarse, granular	sticky, very friable, slightly plastic	
Bmgj	17-36 (11-19)	10YR6/5m	SIL	moderate, medium, subangular blocky	moderate to strong, medium to coarse, granular	sticky, friable, slightly plastic	common, medium, prominent, 10YR5/8
IIBtgj	36-67 (32-42)	10YR5/3m	SIC	moderate, coarse, columnar	moderate to strong, coarse, angular blocky	slightly sticky, firm, plastic	common, medium, prominent, 10YR5/6
IICkgj	67+	10YR5/3m	SICL	weak, coarse, platy	weak, coarse, platy	slightly sticky, firm, plastic	common, fine, distinct, 10YR5/5

			Sand Fraction %							
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 17	0	1	1	1	5	10	18	58	23
Bmgj	17- 36	0	4	1	2	5	9	20	60	20
IIBtgj	36- 67	0						5	54	41
IICkgj	67+	0						8	64	28

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 17	1.16	5.5	4.2	12.6			
Bmgj	17- 36	1.43	5.3	0.8	10.6			
IIBtgj	36- 67	1.47	5.8	0.4	20.3			
IICkgj	67+	1.64	7.5			14.3	3.0	0.1

(2)BVY.L ONTARIO 1985 PROFILE NO.MEFP007

LOCATION	City of St. Catharines, Northeast corner of First St. and Ryckert St., Con. VII, NTS Map Area 30M/3f, 17 TPT 4034 7697
ELEVATION	117 metres
SITE	Abandoned farmland
LANDFORM AND PARENT MATERIALS	Nearly level to very gently sloping lacustrine plain with mainly silty clay and silty clay loam textures. Clays occasionally overlain by 15 to 40 cm of loamy sediments
SLOPE	2.5% complex
SOIL WATER REGIME	Imperfectly drained, conductivity low, saturation period medium
STONINESS	Nonstony
CLASSIFICATION	Gleyed Brunisolic Gray Brown Luvisol, fine clayey, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Taxadjunct to Gleyed Brunisolic Gray Brown Luvisol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-21 (18-22)	10YR4/3m	SIL	moderate, coarse, granular	strong, medium, granular	slightly sticky, very friable, slightly plastic	
Bmgj	21-27 (6-8)	10YR5/3m	SIL	weak to moderate, coarse, granular	moderate, medium, granular	slightly sticky, very friable, slightly plastic	common, fine, distinct, 10YR5/5
IIBtgj	27-49 (20-22)	10YR4/2m	SICL	weak to moderate, coarse, columnar	weak to moderate, coarse, platy	sticky, firm, plastic	common, fine, distinct, 10YR4/4
IICkgj	49+	10YR5/2m	SICL	moderate to strong, coarse, angular blocky	moderate, coarse, angular blocky	sticky, very firm, very plastic	common, fine, distinct, 10YR5/4

		Sand Fraction %								
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0-21	0	1	1	2	6	10	20	60	20
Bmgj	21-27	0	2	2	2	7	11	25	52	23
IIBtgj	27-49	0	0	0	1	5	9	15	51	34
IICkgj	49+	0						5	57	38

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0-21	1.30	6.8	3.1	12.7			
Bmgj	21-27	1.42	6.7	0.5	9.1			
IIBtgj	27-49	1.52	7.0	0.4	15.8			
IICkgj	49+	1.66	7.7			16.0	3.2	0.1

BEVERLY SOIL - LOAMY RED PHASE (BVY.LR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued lacustrine silty clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	15	18	0	23	13	53	24	SIL	3.6	6.3	0.1
IIBmgj	10	53	0	13	7	51	36	SICL	0.7	6.3	0.7
IIBtgj	13	56	0	9	2	45	46	SIC	0.8	6.1	0.5
IICkgj	11		0	5	1	48	47	SIC		7.5	13.5

BOOKTON SOIL (BOO)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over lacustrine silty clay

DRAINAGE Well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	15	1	68	24	25	7	FSL	2.2	6.4	
Bm	1	25	0	77	24	18	5	LFS	0.6	6.2	
Bt	1	46	1	73	24	19	8	FSL	0.2	6.1	
IIBt	1		0	18	9	43	39	SICL	0.5	6.4	

BOOKTON SOIL - RED PHASE (BOO.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued sandy textures over lacustrine silty clay

DRAINAGE Well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	2	17	1	51	31	33	16	L	5.4	6.9	2.3
Bm	2	45	1	67	38	23	10	VFSL	0.9	6.6	0.5
Bt	1	55	0	78	25	7	15	FSL	0.6	7.1	1.2
IIBt	1	78	0	19	5	35	46	C	0.1	6.8	
IICk	2		1	9	4	48	43	SIC	0.3	7.6	20.8

BOOKTON SOIL - TILL PHASE (BOO.T)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over clay loam till

DRAINAGE Well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	3	28	4	61	16	28	11	FSL	2.6	5.8	0.0
Bt	3	62	8	54	10	25	21	SCL	1.6	6.3	0.3
Bm	2	76	2	80	17	15	5	LFS	0.8	5.8	0.0
IICk	2		1	6	0	45	49	SIC		7.7	18.0

* although there are local occurences of this soil, the areas are too small to map and therefore do not appear on the soil maps

BRADY

BRADY SOIL (BAY)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine loamy sand and sand

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	5	26	1	84	11	10	6	LS	3.0	6.1	0.2
Bmgj1	7	69	0	88	9	9	3	S	0.5	6.0	
Bmgj2	2	88	1	93	6	4	3	FS	0.4	6.0	
Ckgj	2		2	94	1	4	2	S		7.4	6.0

BRADY SOIL - RED PHASE (BAY.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine loamy sand and sand

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	2	22	6	73	21	20	7	FSL	2.6	5.4	
Bmgj	3	60	4	82	28	16	2	LFS	0.4	5.5	
Btgj	2		16	82	13	13	5	LS	0.3	5.4	

BRANT SOIL (BRT)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine silt loam and loam

DRAINAGE Well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	19	1	22	15	60	18	SIL	2.8	5.5	
Bm1	4	51	0	18	13	64	18	SIL	1.1	5.6	
Bm2	8	68	2	31	21	56	13	SIL	1.1	5.2	
Ck	1		0	27	13	51	22	SIL		7.5	3.4

BRANT SOIL - RED PHASE (BRT.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine silt loam and loam

DRAINAGE Well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	14	20	1	36	25	51	13	SIL	2.4	5.7	
Bt	15	65	0	28	22	54	18	SIL	0.6	5.4	
Bm1	14	73	1	38	32	53	9	SIL	0.4	5.9	0.1
Bm2	13	107	1	39	31	53	8	SIL	0.2	6.3	0.1
Ck	3		1	17	10	69	14	SIL		7.6	7.6

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

(1)BRT.R ONTARIO 1985 PROFILE NO.EAWP011

LOCATION Town of Niagara-on-the-Lake, Lot 90, Con. X, NTS Map Area 30M/3h, 17 TPT 5388 7891

ELEVATION 149 metres

SITE Plum orchard

LANDFORM AND PARENT MATERIALS Moderately sloping, dissected, lacustrine plain consisting of deep loamy lacustrine sediments

SLOPE 13.5% complex

SOIL WATER REGIME Well drained, conductivity medium to low, saturation period very short

STONINESS Nonstony

CLASSIFICATION Brunisolic Gray Brown Luvisol, loamy, alkaline, strongly calcareous, mild humid to subhumid

STATUS Variant because of bedded Bt horizons

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-10 (10-11)	10YR4/4m	SIL	weak, medium, platy	moderate, medium, granular	slightly sticky, firm, slightly plastic	
Bt1	10-29 (15-28)	7.5YR4/5m	SIL	weak, medium to coarse, platy	weak, medium, subangular blocky	slightly sticky, firm, plastic	
Bm1	29-48 (0-30)	7.5YR5/4m	VFSL	weak, coarse, subangular blocky	weak, medium to coarse, subangular blocky	nonsticky, very friable, nonplastic	
Bt2	48-64 (14-28)	5YR4/4m	L	moderate, coarse, subangular blocky	moderate, medium to coarse, subangular blocky	sticky, firm, plastic	
Bt3	64-78 (14-17)	5YR4/4m	L	moderate, medium, subangular blocky	moderate, medium, subangular blocky	sticky, very firm, very plastic	
Bm2	78+	5YR5/4m	SI	massive	weak, coarse, angular blocky	slightly sticky, very friable, nonplastic	

			Sand Fraction %							
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 10	2	1	2	3	8	19	33	53	14
Bt1	10- 29	3	2	1	2	6	15	26	56	18
Bm1	29- 48	0				7	46	53	45	2
Bt2	48- 64	1	1	1	3	17	25	47	37	15
Bt3	64- 78	1	2	2	3	8	14	29	50	21
Bm2	78+	0				4	10	14	83	3

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 10	1.39	6.4	2.3	11.1			
Bt1	10- 29	1.69	6.5	0.3	9.0			
Bm1	29- 48	1.52	6.1	0.1	6.5			
Bt2	48- 64	1.64	6.2	0.1	9.5			
Bt3	64- 78	1.57	5.8	0.1	12.0			
Bm2	78+	1.29	5.7	0.1	9.5			

(2)BRT.R ONTARIO 1985 PROFILE NO.EAWP009

LOCATION	Town of Grimsby, Lot 6, Con. I, NTS Map Area 30M/4h, 17 TPT 1838 8369
ELEVATION	85 metres
SITE	Abandoned farmland
LANDFORM AND PARENT MATERIALS	Nearly level lacustrine plain consisting of deep loamy lacustrine sediments
SLOPE	1.5% complex
SOIL WATER REGIME	Moderately well drained, conductivity medium to low, saturation period medium
STONINESS	Nonstony
CLASSIFICATION	Orthic Melanic Brunisol, coarse loamy, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Taxadjunct to Brunisolic Gray Brown Luvisol

Horizon	Depth (range) cm	Colour moist	Colour dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-18 (18-21)	10YR4/3m		SIL	weak to moderate, medium, subangular blocky, moderate, fine, platy	weak to moderate, coarse, granular weak, medium to coarse, subangular blocky	slightly sticky, friable, plastic nonsticky, very friable, slightly plastic	
Bm1	18-33 (15-15)	7.5YR5/4m		SIL				
Bm2	33-57 (18-24)	7.5YR4/4m		SIL	weak, medium, platy	weak, medium to coarse, subangular blocky	slightly sticky, very friable, slightly plastic	
Bmgj1	57-75 (18-20)	7.5YR5/4m		SIL	weak, coarse, subangular blocky	weak, coarse, subangular blocky	slightly sticky, friable, slightly plastic	common, medium, distinct, 7.5YR5/6
Bmgj2	75+	7.5YR5/4m		SIL	massive		slightly sticky, very friable, plastic	many, medium, distinct, 7.5YR4/6

		Sand Fraction %								
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 18	0	0	1	1	3	18	22	67	10
Bm1	18- 33	0	0	0	0	1	15	16	74	9
Bm2	33- 57	0	0	1	0	1	20	21	69	10
Bmgj1	57- 75	0	0	1	2	0	10	14	80	6
Bmgj2	75+	0	1	1	1	1	15	19	74	8

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 18	1.20	6.7	2.4	11.3			
Bm1	18- 33	1.36	6.6	0.6	7.4			
Bm2	33- 57	1.37	6.7	0.2	8.0			
Bmgj1	57- 75	1.42	6.6	0.2	8.4			
Bmgj2	75+	1.40	6.4	0.1	9.2			

BRANTFORD

BRANTFORD SOIL (BFO)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine silty clay

DRAINAGE Moderately well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	20	18	0	13	5	51	36	SICL	3.7	6.4	1.1
Bm	8	43	0	11	3	51	38	SICL	1.8	6.0	1.0
Bt	18	51	0	8	2	45	47	SIC	1.3	6.3	0.4
Ck	18		0	6	1	45	49	SIC	0.2	7.6	15.0

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

BFO ONTARIO 1985 PROFILE NO.MEFP004

LOCATION Township of West Lincoln, Lot 16, Con. V, NTS Map Area 30M/4b, 17 TPT 0646 7205

ELEVATION 204 metres

SITE Alfalfa hay field

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping glaciolacustrine clay plain consisting of sediments with dominantly silty clay and heavy clay textures

SLOPE 4.5% complex

SOIL WATER REGIME Moderately well drained, conductivity low, saturation period short

STONINESS Nonstony

CLASSIFICATION Orthic Gray Brown Luvisol, fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Taxadjunct to Brunisolic Gray Brown Luvisol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-14 (19-23)	10YR4/3m	SIL	weak to moderate, medium, angular blocky	moderate, coarse, granular	slightly sticky, friable, plastic	
IIBt1	14-43 (28-31)	10YR4/4m	CL	moderate, coarse, angular blocky	moderate to strong, coarse, angular blocky	slightly sticky, friable, plastic	
IIBt2	43-56 (11-14)	10YR4/3m	SIC	weak, medium, columnar	moderate, coarse, angular blocky	sticky, firm, very plastic	
IICkgj	56+	10YR5/2m	SIC	weak to moderate, medium, columnar	moderate to strong, coarse, angular blocky	sticky, very firm, very plastic	common, fine, distinct, 10YR5/4

Horizon	Depth cm	Sand Fraction % Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 14	0	1	1	2	3	10	17	58	25
IIBt1	14- 43	0	2	2	3	5	8	20	43	37
IIBt2	43- 56	0						4	49	47
IICkgj	56+	0						5	48	47

Horizon	Depth cm	Bulk Density g/cm³	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 14	1.25	6.7	3.2	10.9			
IIBt1	14- 43	1.40	5.3	0.6	11.9			
IIBt2	43- 56	1.38	6.8	0.6	21.2			
IICkgj	56+	1.44	7.6			25.0	6.3	0.2

BRANTFORD SOIL - LOAMY PHASE (BFO.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over lacustrine silty clay

DRAINAGE Moderately well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	11	19	0	21	11	54	25	SIL	4.5	6.6	0.4
Bm	6	27	0	27	14	51	22	SIL	1.2	5.4	0.0
IIBt	15	58	0	9	2	44	47	SIC	0.9	6.4	0.1
IICk	10		0	5	1	47	48	SIC	0.1	7.6	13.0

BRANTFORD SOIL - RED PHASE (BFO.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine silty clay

DRAINAGE Moderately well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	20	0	10	3	54	36	SICL	3.9	6.7	2.3
Bm	1	46	0	6	0	55	39	SIC	2.1	7.0	5.8
Bt	4	51	0	8	4	45	47	SIC	1.6	6.8	0.8
Ck	3		0	5	0	42	53	SIC	0.3	7.7	15.4

BROOKE

BROOKE SOIL - SHALLOW PHASE (BOK.S)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 50 to 100 cm variable textures over mainly limestone and dolostone bedrock

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Luvic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	9	21	2	24	9	44	32	CL	6.0	6.0	0.2
Btg	5	37	0	15	5	34	51	C	1.2	6.4	1.0
Bg	6	46	2	25	11	41	34	CL	1.2	7.0	0.4
Ckg	5	73	5	24	8	41	35	CL	0.1	7.6	17.7
R											

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

BOK.S ONTARIO 1985 PROFILE NO.EAWP006

LOCATION Town of Fort Erie, Lot 6, Con. VII, NTS Map Area 30L/14h, 17 TPT 6290 5430

ELEVATION 192 metres

SITE Cultivated corn field

LANDFORM AND PARENT MATERIALS Nearly level bedrock plain overlain by thin veneer of variable sediments

SLOPE 1% simple

SOIL WATER REGIME Poorly drained, conductivity medium, saturation period long

STONINESS Slightly stony

CLASSIFICATION Orthic Humic Gleysol, fine loamy/clayey, shallow lithic, alkaline, strongly calcareous, mild humid to subhumid

STATUS Undecided

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-19 (18-29)	10YR3/2m	L	moderate, coarse, granular	moderate, medium to coarse, granular	sticky, friable, very plastic	
Bg1	19-33 (8-15)	10YR4/2m	CL	moderate, fine to medium, columnar	moderate, fine to medium, columnar	sticky, firm, very plastic	common, medium, prominent, 10YR4/6
Bg2	33-40 (7-16)	10YR5/2m	L	moderate, medium, columnar	moderate, medium, columnar	sticky, very firm, very plastic	common, medium, prominent, 5YR4/3
IICkg	40-65 (20-30)	5YR5/2m	HC	moderate, coarse, subangular blocky	moderate, coarse, subangular blocky	sticky, very firm, very plastic	common, medium, prominent, 7.5YR5/6
R	65+						

Horizon	Depth cm	Sand Fraction % Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 19	3	3	3	4	9	12	30	46	24
Bg1	19- 33	10	3	3	5	12	16	38	34	28
Bg2	33- 40	0	6	3	4	6	12	31	43	26
IICkg	40- 65	9						8	31	61
R	65+									

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 19	1.20	6.4	5.4	18.1			
Bg1	19- 33	1.66	5.5	1.0	18.2			
Bg2	33- 40	1.50	6.2	0.9	18.2			
IICkg	40- 65	1.67	7.6			23.0	0.6	0.1
R	65+							

BROOKE SOIL - VERY SHALLOW PHASE (BOK.V)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 20 to 50 cm variable textures over mainly limestone and dolostone bedrock

DRAINAGE Poor.

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	12	17	1	13	4	52	35	SICL	4.6	6.7	0.7
Btg	4	28	1	10	3	47	43	SIC	1.1	7.0	0.0
Bg	7	34	4	15	5	50	35	SICL	1.6	6.9	0.3
Ckg	7	43	1	11	4	53	36	SICL	0.2	7.6	17.3
R											

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

BOK.V ONTARIO 1985 PROFILE NO.EAWSP008

LOCATION Town of Port Colborne, Lot 22, Con. III, NTS Map Area 30L/14g, 17 TPT 4540 5220

ELEVATION 183 metres

SITE Hay field

LANDFORM AND PARENT MATERIALS Nearly level bedrock plain overlain by thin cover of variable sediments

SLOPE 1% complex

SOIL WATER REGIME Poorly drained, conductivity medium, saturation period long

STONINESS Slightly stony

CLASSIFICATION Orthic Humic Gleysol, loamy, very shallow lithic, mild humid to subhumid

STATUS Undecided

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-16 (14-18)	10YR3/2m	SICL	moderate to strong, coarse, granular	moderate to strong, coarse, granular	sticky, firm, very plastic	
Bg	16-37 (19-23)	10YR3/2m	SICL	moderate to strong, medium, columnar	moderate to strong, medium, columnar	sticky, firm, very plastic	many, fine, prominent, 10YR5/8
R	37+						

		Sand Fraction %											
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm^3	Porosity %
Ap	0- 16	0	1	2	2	2	6	13	49	38	16	1.31	48
Bg	16- 37	1	1	1	2	6	13	23	44	33	20	1.69	49
R	37+												

		% Moisture Retention (g/g)												
Horizon	Depth cm	0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 16	57.0	47.3	42.3	21.7	20.6	0.40		7.2	7.0	6.2	29.5	1.0	
Bg	16- 37	54.3	45.7	42.0	31.3	10.7	0.08		7.3	7.0	1.0	20.5	0.0	
R	37+													

CASHEL SOIL (CSH)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm lacustrine silty clay over clay loam till

DRAINAGE Moderately well

USUAL CLASSIFICATION Orthic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	3	17	1	19	9	53	28	SICL	2.6	5.7	
Bt	2	45	1	10	5	38	52	C	0.9	6.5	
IICk	2		8	10	2	54	36	SICL		7.7	12.0

CASHEL SOIL - RED WASHED PHASE (CSH.RW)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm lacustrine silty clay over washed reddish-hued clay loam till

DRAINAGE Moderately well

USUAL CLASSIFICATION Orthic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	22	0	15	5	43	42	SIC	12.3	5.8	
Bm1	2	55	0	16	6	45	39	SICL	2.6	5.4	
Bm2	2		0	25	7	44	31	CL	0.7	5.1	

* although there are local occurences of this soil, the areas are too small to map and therefore do not appear on the soil maps

CHINGUACOUSY SOIL (CGU)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly clay loam till

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	21	19	5	24	9	47	29	CL	3.1	6.5	0.4
Bmgj	17	50	2	19	8	49	32	SICL	0.1	6.4	0.0
Btgj	17	52	2	16	6	45	39	SICL	0.9	6.2	0.2
Ckgj	17		4	16	6	48	36	SICL	0.1	7.5	8.3

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

CGU ONTARIO 1985 PROFILE NO. LWSSP005

LOCATION Town of Niagara-on-the-Lake, Lot 1, Con. V, NTS Map Area 30M/3g, 17 TPT 4941 8354

ELEVATION 99 metres

SITE Cultivated corn field

LANDFORM AND PARENT MATERIALS Level to nearly level clay till plain

SLOPE 1.5% simple

SOIL WATER REGIME Imperfectly drained, conductivity medium to low, saturation period medium

STONINESS Nonstony

CLASSIFICATION Gleyed Gray Brown Luvisol, fine loamy, alkaline, strongly calcareous, mild humid to subhumid

STATUS Taxadjunct to Gleyed Brunisolic Gray Brown Luvisol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-27 (22-30)	10YR3/2m	CL	weak to moderate, medium, granular	moderate, fine to medium, granular	slightly sticky, friable, very plastic	
Btgj	27-40 (10-19)	10YR4/3m	CL	very weak, coarse, subangular blocky	very weak, coarse, subangular blocky	slightly sticky, firm, very plastic	many, fine, prominent, 10YR4/6
Ckgj	40+	10YR4/3m	CL	weak to moderate, coarse, subangular blocky	moderate, medium to coarse, subangular blocky	slightly sticky, very firm, very plastic	common, medium, prominent, 10YR4/6

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm³	Porosity %
Ap	0- 27	5	1	2	3	5	11	21	50	29	12	1.25	52
Btgj	27- 40	1	4	3	3	4	4	21	43	36	16	1.53	43
Ckgj	40+	6	4	2	2	4	7	20	49	31	10	1.69	37

Horizon	Depth cm	% Moisture Retention (g/g) 0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 27	57.0	38.0	27.3	13.3	14.0	1.40		7.4	7.1	3.2	18.3	1.0	
Btgj	27- 40	49.0	41.0	37.3	25.3	12.0	0.08		7.6	7.2	0.8	19.0	1.0	
Ckgj	40+	39.7	32.3	29.3	22.0	7.3	0.90	0.2	8.1	7.7			10.0	1.4

CHINGUACOUSY SOIL - COARSE PHASE (CGU.C)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm sandy textures over clay loam till

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	2	22	9	56	20	30	14	FSL	2.5	7.0	0.5
IIBmgj	1	42	4	43	19	39	18	L	0.8	6.9	0.0
IIBtgj	4	52	3	25	8	40	35	CL	0.7	7.0	0.3
IICkg	2		3	17	4	45	38	SICL		7.6	8.9

CHINGUACOUSY SOIL - LOAMY PHASE (CGU.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over clay loam till

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	22	19	3	27	12	50	23	SIL	3.5	6.6	0.7
Bm	11	30	4	31	13	50	19	SIL	1.7	6.3	0.1
IIBtgj1	8	39	2	23	9	41	36	CL	1.1	6.2	0.2
IIBtgj2	30	54	3	18	6	44	38	SICL	0.7	6.2	0.1
IICkgj	19		3	17	5	47	36	SICL	0.1	7.5	6.7

CHINGUACOUSY SOIL - LOAMY RED PHASE (CGU.LR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued clay loam till

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	12	18	5	27	10	49	24	SIL	4.0	6.3	0.5
IIBmgj	2	38	4	18	7	47	35	SICL	0.9	5.5	0.0
IIBtgj1	8	54	3	18	7	43	39	SICL	0.8	6.0	0.1
IIBtgj2	4	57	2	18	6	41	41	SIC	0.8	6.9	2.0
IICkgj	8		6	16	6	48	36	SICL	0.3	7.4	11.2

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

CGU.LR ONTARIO 1985 PROFILE NO.MEFP012

LOCATION Town of Niagara-on-the-Lake, Lot 95, Con. X, NTS Map Area 30M/3h, 17 TPT 5279 7950

ELEVATION 131 metres

SITE Winter wheat field

LANDFORM AND PARENT MATERIALS Very gently sloping clay till plain overlain by discontinuous loamy lacustrine sediments

SLOPE 3.5% complex

SOIL WATER REGIME Imperfectly drained, conductivity medium, saturation period low to medium

STONINESS Nonstony

CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol, loamy/fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Modal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-20 (20-22)	10YR3/3m	SIL	weak, medium, granular	moderate to strong, coarse, granular	slightly sticky, very friable, slightly plastic	
Bmgj	20-33 (12-14)	10YR4/3m	SIL	very weak, coarse, granular	weak, medium, subangular blocky	sticky, friable, very plastic	common, fine, distinct, 10YR5/4
IIBtgj	33-53 (18-21)	7.5YR4/2m	SIC	weak, fine, columnar	weak, fine, columnar	very sticky, firm, very plastic	common, fine, distinct, 7.5YR5/4
IICkgj	53+	7.5YR4/2m	SIC	moderate, coarse, angular blocky	moderate to strong, coarse, subangular blocky	sticky, firm, very plastic	common, fine, distinct, 7.5YR5/4

Horizon	Depth cm	Sand Fraction % Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 20	2	3	3	4	4	9	23	53	24
Bmgj	20- 33	4	3	4	5	5	7	23	53	24
IIBtgj	33- 53	4	1	1	1	3	5	11	49	40
IICkgj	53+	1	1	1	1	4	5	12	46	42

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 20	1.22	7.0	2.8	15.0	1.0		
Bmgj	20- 33	1.41	7.0	2.0	15.6	1.0		
IIBtgj	33- 53	1.49	7.3	0.6	19.8	1.0		
IICkgj	53+	1.54	7.4			11.0	2.5	0.2

CHINGUACOUSY SOIL - RED PHASE (CGU.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued clay loam till

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	9	20	2	28	9	42	30	CL	3.6	6.5	0.3
Bmgj	6	48	3	24	9	42	34	CL	0.7	6.2	0.1
Btgj	6	60	2	17	7	43	40	SICL	0.8	6.0	0.3
Ckgj	6		7	19	7	41	40	SICL		7.6	13.2

CHINGUACOUSY SOIL - RED WASHED PHASE (CGU.RW)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Washed reddish-hued clay loam till, modified by lacustrine processes

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	21	20	6	40	15	42	18	L	3.6	6.3	0.2
Bmgj	21	51	6	38	14	43	19	L	1.9	6.2	0.5
Btgj	13	54	5	31	12	41	28	CL	1.3	5.9	0.1
Ckgj	14		7	30	12	50	20	SIL		7.5	10.1

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

CGU.RW ONTARIO 1985 PROFILE NO.LWSSP004

LOCATION	Township of Wainfleet, Lot 13, Con. I, NTS Map Area 30L/14f, 17 TPT 3508 4932
ELEVATION	186 metres
SITE	Cultivated corn field
LANDFORM AND PARENT MATERIALS	Very gently sloping till moraine composed of washed clayey and loamy till materials
SLOPE	2.5% simple
SOIL WATER REGIME	Imperfectly drained, conductivity medium to low, saturation period medium
STONINESS	Slightly stony
CLASSIFICATION	Gleyed Gray Brown Luvisol, fine clayey/loamy, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Taxadjunct to Gleyed Brunisolic Gray Brown Luvisol. Also variant because of high gravel content in surface horizon and lower than normal clay contents in lower horizons

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-14 (14-24)	10YR3/2m	L	moderate, medium, granular	strong, medium, granular	sticky, friable, plastic	
Btgj1	14-30 (0-19)	10YR4/3m	CL	moderate to strong, coarse, columnar	weak to moderate, coarse, subangular blocky	sticky, firm, plastic	common, medium, prominent, 7.5YR4/6
Btgj2	30-40 (8-35)	5YR4/3m	CL	moderate, coarse, subangular blocky	moderate to strong, medium to coarse, subangular blocky	sticky, firm, plastic	common, medium, prominent, 7.5YR4/6
Bmgj	40-66 (20-49)	5YR4/3m	CL	weak, coarse, subangular blocky	moderate,medium to coarse, subangular blocky	slightly sticky, firm, plastic	many, fine, prominent, 7.5YR4/6
Ckgj	66+	5YR4/3m	SIL	weak, coarse, subangular blocky	weak to moderate, medium to coarse, subangular blocky	slightly sticky, firm, plastic	few, fine, distinct, 7.5YR4/4

			Sand Fraction %										
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm³	Porosity %
Ap	0-14	11	3	5	10	9	13	40	41	19	14	1.07	59
Btgj1	14-30	2	2	2	4	7	9	24	37	38	6	1.73	35
Btgj2	30-40	4	4	3	4	6	10	27	35	38	15	1.63	37
Bmgj	40-66	0	1	1	2	8	20	32	40	28	11	1.69	36
Ckgj	66+	4	1	1	2	5	13	22	56	22	5	1.87	31

		% Moisture Retention (g/g)												
Horizon	Depth cm	0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0-14	57.7	42.3	28.3	10.0	18.3	8.50		5.7	5.8	3.4	11.2		
Btgj1	14-30	48.7	41.3	37.7	24.7	13.0	0.05		6.7	6.7	0.6	18.2		
Btgj2	30-40	47.7	38.3	34.7	24.0	10.7	19.30		7.0	6.6	0.5	17.6		
Bmgj	40-66	47.7	37.0	32.0	19.0	13.0	0.10		7.6	7.0	0.4	13.6	1.0	
Ckgj	66+	38.3	30.7	22.3	19.7	2.6	0.06	0.1	8.0	7.6			14.0	

CHINGUACOUSY SOIL - WASHED PHASE (CGU.W)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Washed clay loam till, modified by lacustrine processes

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	21	21	5	34	15	46	20	L	3.0	6.6	0.8
Bmgj	18	48	5	31	13	45	24	L	0.9	6.6	0.4
Btgj	13	55	7	31	12	41	28	CL	0.7	6.7	0.2
Ckgj	13		9	31	11	47	22	L	0.1	7.5	8.6

COLWOOD

COLWOOD SOIL (CWO)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine silt loam

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	16	24	0	36	25	44	20	L	6.2	6.6	0.5
Bg	14	50	0	34	24	44	22	L	0.9	6.8	1.0
Ckg	16		0	27	19	55	18	SIL		7.5	15.2

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

CWO ONTARIO 1985 PROFILE NO.EWPSP004

LOCATION Township of Wainfleet, Lot 29, Con. II, NTS Map Area 30L/14e, 17 TPT 2848 4963

ELEVATION 177 metres

SITE Cultivated soybean field

LANDFORM AND PARENT MATERIALS Level to nearly level lacustrine plain consisting of deep loamy lacustrine sediments

SLOPE 0.5% complex

SOIL WATER REGIME Poorly drained, conductivity low, saturation period long

STONINESS Nonstony

CLASSIFICATION Orthic Humic Gleysol, loamy, alkaline, strongly calcareous, mild humid to subhumid

STATUS Modal. Higher than normal silt content in lowest C horizon

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-23 (23-25)	10YR3/1m	SIL	massive	weak, medium to coarse, subangular blocky	slightly sticky, friable, very plastic	
Bg	23-35 (5-13)	10YR6/2m	L	moderate, medium, prismatic		slightly sticky, very firm, very plastic	common, fine, prominent, 10YR5/6
Ckgj1	35-52 (21-15)	10YR5/2m	SL	massive	weak to moderate, coarse, platy	slightly sticky, friable, plastic	few, fine, faint, 10YR5/4
Ckgj2	52-80 (29-36)	10YR5/3m	SIL	massive		slightly sticky, firm, very plastic	many, coarse, prominent, 10YR5/6
Ckg	80+	10YR5/2m	SI	moderate, coarse, platy	weak, coarse, subangular blocky	slightly sticky, friable, nonplastic	many, coarse, prominent, 10YR5/6

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm³	Porosity %
Ap	0-23	1	0	0	1	2	19	23	55	22	7	1.06	57
Bg	23-35	0	0	0	0	5	42	47	33	20	8	1.69	37
Ckgj1	35-52	0	0	0	0	5	49	54	31	15	6	1.64	40
Ckgj2	52-80	0	0	0	0	2	21	24	54	22	7	1.55	42
Ckg	80+		0					9	81	10	4	1.53	44

Horizon	Depth cm	% Moisture Retention (g/g) 0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0-23	58.3	49.7	42.0	16.7	25.3	0.06		7.5	7.4	10.3	49.9	4.0	
Bg	23-35	40.0	33.7	27.0	12.7	14.3	0.10		7.8	7.4	0.4	11.1	1.0	
Ckgj1	35-52	41.7	34.7	26.0	12.0	14.0	0.02	0.5	7.9	7.6			12.0	0.3
Ckgj2	52-80	46.3	36.7	29.0	15.0	14.0	0.03	0.7	7.8	7.7			18.0	1.2
Ckg	80+	47.3	38.7	32.3	13.7	18.6	0.06	0.6	7.9	7.5			22.0	1.4

COLWOOD SOIL - RED PHASE (CWO.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine silt loam

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	22	1	34	21	48	18	SIL	2.7	6.4	0.1
Btg	9	52	0	28	18	44	28	CL	0.8	6.5	0.2
Bg	6	82	2	40	25	46	14	L	0.6	6.9	0.4
Ckg	3		0	28	21	57	15	SIL		7.6	12.9

FARMINGTON

FARMINGTON SOIL (FRM)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 10 to 20 cm variable textures over mainly limestone and dolostone bedrock

DRAINAGE Rapid

USUAL CLASSIFICATION Orthic Melanic Brunisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	19	19	4	0	52	44	SIC	5.1	6.4	
R	1										

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

FRM ONTARIO 1985 PROFILE NO.EAWP005

LOCATION City of Port Colborne, Lot 33, Con. II, NTS Map Area 30L/14f, 17 TPT 4086 5006

ELEVATION 180 metres

SITE Idle land

LANDFORM AND PARENT MATERIALS Level to nearly level bedrock plain, overlain by thin veneer of variable sediments

SLOPE 1% simple

SOIL WATER REGIME Rapidly drained, conductivity high, saturation period very short

STONINESS Slightly stony

CLASSIFICATION Orthic Humic Regosol, extremely shallow lithic, mild humid to subhumid

STATUS Taxadjunct to Orthic Melanic Brunisol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-19 (18-20)	10YR3/3m	SIC	moderate to strong, coarse, granular	moderate to strong, medium, granular	sticky, very friable, very plastic	
R	19+						

			Sand Fraction %							
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0-19	19						4	52	44
R	19+									

Horizon	Depth cm	Bulk Density g/cm³	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0-19	1.23	6.4	5.1	20.2			
R	19+							

FARMINGTON SOIL - SHALLOW PHASE (FRM.S)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 50 to 100 cm variable textures over mainly limestone and dolostone bedrock

DRAINAGE Rapid

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	17	4	39	14	40	21	L	6.2	6.8	0.8
Bm1	6	37	9	44	10	41	15	L	1.5	6.3	0.1
Bt	2	59	6	38	11	34	28	CL	0.5	6.6	0.4
Bm2	2	64	9	50	6	39	11	L	1.0	5.7	0.0
R											

FARMINGTON SOIL - VERY SHALLOW PHASE (FRM.V)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 20 to 50 cm variable textures over mainly limestone and dolostone bedrock

DRAINAGE Rapid

USUAL CLASSIFICATION Orthic Melanic Brunisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	11	19	11	33	14	48	19	L	6.3	6.9	3.7
Bm	10	33	10	32	14	49	19	L	2.6	6.8	2.9
R	11										

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

FRM.V ONTARIO 1985 PROFILE NO.E/AWSP003

LOCATION	Town of Lincoln, Lot 19, Con. IX, NTS Map Area 30M/3d, 17 TPT 2313 7447
ELEVATION	192 metres
SITE	Abandoned farmlamd
LANDFORM AND PARENT MATERIALS	Level to very gently sloping bedrock plain, overlain by thin veneer of variable sediments
SLOPE	2% complex
SOIL WATER REGIME	Rapidly drained, conductivity high, saturation period very short
STONINESS	Slightly stony
CLASSIFICATION	Orthic Melanic Brunisol, coarse loamy, very shallow lithic, mild humid to subhumid
STATUS	Modal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-11 (9-11)	10YR3/3m	SIL	moderate, coarse, granular	moderate, medium to coarse, granular	slightly sticky, very friable, slightly plastic	
Bm	11-24 (9-13)	7.5YR5/6m	SIL	moderate, medium, subangular blocky	moderate, medium, granular	slightly sticky, very friable, slightly plastic	
R	24+						

			Sand Fraction %										
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm³	Porosity %
Ap	0-11	0	0	1	2	7	24	34	60	6	1	1.01	60
Bm	11-24	0	0	0	1	5	20	27	67	6	1	1.05	58
R	24+												

		% Moisture Retention (g/g)												
Horizon	Depth cm	0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0-11	68.0	43.3	31.3	10.7	20.5	28.0		7.6	7.2	7.5	28.5	12.0	
Bm	11-24	63.0	50.3	37.7	11.3	26.4	5.5		7.8	7.1	5.3	20.8	6.0	
R	24+													

FLAMBOROUGH SOIL (FMB)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine sandy loam and very fine sandy loam

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	2	27	1	56	38	29	15	VFSL	3.6	7.0	0.9
Btg	1	52	0	52	33	25	23	VFSL	0.5	6.0	
Bg	4	83	0	80	37	13	7	LS	0.4	6.7	
Ckg	1		0	52	21	43	5	SL		6.7	

FLAMBOROUGH SOIL - BROWN PHASE (FMB.B)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly brownish-hued lacustrine sandy loam and very fine sandy loam

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	22	0	56	48	36	8	VFSL	2.2	6.1	
Bmgj	1	30	0	51	46	39	10	L	1.3	5.9	
Bg1	1	52	0	56	44	36	8	VFSL	0.5	5.9	
Bmgj	1	72	0	86	35	9	5	LFS	0.3	5.8	
Bg2	1		3	89	43	7	4	FS	0.1	6.4	

FONTHILL SOIL (FNT)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued coarse sandy loam and gravelly sand

DRAINAGE Rapid

USUAL CLASSIFICATION Orthic Melanic Brunisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	27	24	15	67	14	24	9	CSL	2.1	5.9	1.1
Bm1	36	48	20	72	13	21	7	GCSL	1.2	5.8	0.9
Btj	15	68	19	71	18	20	9	SL	0.4	5.5	
Bm2	20	87	17	80	9	14	6	LCS	0.3	5.4	
Bm3	11	115	16	82	9	12	6	LCS	0.1	5.4	
Ck	4		33	85	3	9	6	GLCS		7.3	19.5

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

FNT ONTARIO 1985 PROFILE NO. EWPSP005

LOCATION Town of Pelham, Lot 9, Con. VIII, NTS Map Area 30M/3c, 17 TPT 3606 6623

ELEVATION 241 metres

SITE Sour cherry orchard

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping kame moraine deposits consisting mainly of reddish-hued sandy and gravelly soil materials

SLOPE 1% simple

SOIL WATER REGIME Rapidly to well drained, conductivity high, saturation period very short

STONINESS Nonstony

CLASSIFICATION Orthic Melanic Brunisol, sandy, mild humid to subhumid

STATUS Modal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-21 (9-25)	10YR3/2m	CSL	weak, medium, subangular blocky	weak, fine, subangular blocky	slightly sticky, friable, slightly plastic	
Bm1	21-54 (16-58)	7.5YR4/4m	CSL	moderate, medium, subangular blocky		nonsticky, friable, nonplastic	
Bm2	54-74 (0-35)	5YR4/3m	LCS	single grain		nonsticky, very friable, nonplastic	
Bm3	74+	5YR3/3m	LCS	single grain		nonsticky, loose, nonplastic	

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm³	Porosity %
Ap	0- 21	12	13	17	19	0	20	69	23	8	3	1.35	49
Bm1	21- 54	17	12	22	19	11	8	72	22	6	2	1.47	45
Bm2	54- 74	7	20	40	17	5	3	85	11	4	3	1.43	47
Bm3	74+	10	[illegible]	36	14	6	3	86	10	4	1	1.35	50

Horizon	Depth cm	% Moisture Retention (g/g) 0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 21	51.0	32.7	23.3	7.3	16.0	7.30		6.6	6.3	2.7	19.5		
Bm1	21- 54	46.7	25.3	17.0	6.0	11.0	4.90		6.8	6.2	0.4	32.5		
Bm2	54- 74	46.0	20.7	15.3	6.7	8.6	10.20		5.8	4.9	0.1	12.1		
Bm3	74+	49.3	20.7	14.3	6.0	8.3	5.00		6.1	5.0	0.1	17.1		

FOX

FOX SOIL (FOX)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine sand and loamy sand

DRAINAGE Rapid

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	22	8	68	8	23	9	SL	2.2	5.5	
Bm1	4	49	8	80	8	15	5	LS	0.6	5.2	
Bm2	4	79	13	87	6	9	4	S	0.3	5.3	
Bm3	4		4	87	6	9	4	S	0.2	5.5	

FOX SOIL - RED PHASE (FOX.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine sand and loamy sand

DRAINAGE Rapid

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Texture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	5	22	2	74	15	17	9	SL	2.3	6.2	
Bm1	5	40	3	80	10	16	4	LS	0.5	5.7	
Bm2	3	59	4	85	11	11	4	LS	0.2	5.7	
Bt	7		1	82	34	12	6	LVFS	0.2	5.8	

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

FOX.R ONTARIO 1985 PROFILE NO.EWPSP002

LOCATION Town of Pelham, Lot 1, Con. V, NTS Map Area 30M/3c, 17 TPT 3955 6930

ELEVATION 156 metres

SITE Forested site in St. Johns Conservation area

LANDFORM AND PARENT MATERIALS Moderately sloping, dissected glaciolacustrine sands

SLOPE 13.5% complex

SOIL WATER REGIME Well to rapidly drained, conductivity high, saturation period very short

STONINESS Nonstony

CLASSIFICATION Brunisolic Gray Brown Luvisol, sandy, mild humid to subhumid

STATUS Modal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ah	0-10 (7-13)	10YR3/1m	FSL	weak, coarse, granular	weak, medium, granular	slightly sticky, very friable, slightly plastic	
Bm	10-38 (23-33)	10YR5/6m	SL	massive	single grain	nonsticky, friable, nonplastic	
Bt	38-66 (15-31)	7.5YR4/4m	FSL	massive	single grain	nonsticky, friable, nonplastic	
Btj	66-100	5YR4/4m	LS	massive	single grain	slightly sticky, friable, slightly plastic	

			Sand Fraction %										
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm³	Porosity %
Ah	0- 10	0	0	4	25	27	10	67	24	10	8	0.86	67
Bm	10- 38	0	0	3	30	29	10	72	23	5	2	1.10	59
Bt	38- 66	0	0	5	33	30	8	76	15	9	2	1.09	59
Btj	66-100	0	0	5	42	29	6	81	12	7	2	1.33	51

		% Moisture Retention (g/g)											
Horizon	Depth cm	0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ah	0- 10	63.7	40.3	30.7	5.7	25.0			4.5	4.8	6.7	30.9		
Bm	10- 38	57.0	36.0	22.0	3.3	18.7	14.20		5.0	4.4	0.8	7.4		
Bt	38- 66	52.0	26.7	14.7	4.0	10.7	9.10		5.3	6.6	0.3	10.3		
Btj	66-100	45.7	23.0	14.3	5.7	8.6	10.00		5.7	5.0	0.1	32.8		

FRANKTOWN

FRANKTOWN SOIL - SHALLOW PHASE (FKW.S)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 50 to 100 cm variable textures over mainly limestone and dolostone bedrock

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	13	24	3	27	10	48	25	L	4.3	6.3	0.7
Bmgj	7	42	7	46	11	36	18	L	1.0	6.2	0.3
Btgj	14	51	1	17	6	45	38	SICL	0.9	6.8	1.0
Ckgj	5	76	9	33	10	45	22	L	0.1	7.5	21.0
R	13										

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

FKW.S ONTARIO 1985 PROFILE NO.EAWP020

LOCATION Town of Fort Erie, Lot 10, Con. II, NTS Map Area 30L/15e, 17 TPT 6413 5043

ELEVATION 184 metres

SITE Idle scrubland

LANDFORM AND PARENT MATERIALS Nearly level bedrock plain overlain by thin veneer of variable sediments

SLOPE 1.5% simple

SOIL WATER REGIME Imperfectly drained, conductivity medium, saturation period medium to short

STONINESS Nonstony

CLASSIFICATION Gleyed Melanic Brunisol, coarse loamy, shallow lithic, mild humid to subhumid.

STATUS Taxadjunct to Gleyed Brunisolic Gray Brown Luvisol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-23 (19-23)	10YR3/3m	L	weak to moderate, medium to coarse, subangular blocky	weak to moderate, fine to medium, subangular blocky	slightly sticky, very friable, slightly plastic	
Bm	23-41 (13-18)	10YR4/4m	L	weak to moderate, coarse, subangular blocky	weak to moderate, fine to medium, subangular blocky	slightly sticky, very friable, nonplastic	
Bmgj	41-69 (26-32)	10YR5/3m	FSL	weak to moderate, medium to coarse, subangular blocky	weak, fine to medium, subangular blocky	slightly sticky, friable, nonplastic	few, fine, distinct, 10YR5/6
R	69+						

Horizon	Depth cm	Sand Fraction % Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0-23	9	3	4	7	13	16	43	42	16
Bm	23-41	12	3	6	9	16	17	50	39	11
Bmgj	41-69	2	3	4	10	22	19	59	25	15
R	69+									

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0-23	1.08	4.6	4.0	8.8			
Bm	23-41	1.46	4.8	0.4	5.3			
Bmgj	41-69	1.59	5.6	0.3	7.8			
R	69+							

FRANKTOWN SOIL - VERY SHALLOW PHASE (FKW.V)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 20 to 50 cm variable textures over mainly limestone and dolostone bedrock

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Melanic Brunisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	11	18	7	32	11	46	22	L	4.4	6.2	0.3
Bmgj	8	35	9	33	11	45	22	L	1.9	6.1	0.3
R	11										

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

FKW.V ONTARIO 1985 PROFILE NO.MEFP006

LOCATION Town of Grimsby, Lot 2, Con. III, NTS Map Area 30M/14h, 17 TPT 1929 8091

ELEVATION 191 metres

SITE Abandoned farmland

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping bedrock plain, overlain by thin veneer of variable sediments

SLOPE 2% complex

SOIL WATER REGIME Imperfectly drained, conductivity medium to high, saturation period medium to short

STONINESS Nonstony

CLASSIFICATION Gleyed Melanic Brunisol, fine loamy, very shallow lithic, mild humid to subhumid

STATUS Modal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-22 (21-23)	10YR3/1m	SICL	moderate to strong, coarse, granular	strong, coarse, granular	slightly sticky, very friable, slightly plastic	
Bmgj	22-43 (19-22)	10YR4/3m	SICL	massive	weak, coarse, angular blocky	slightly sticky, very friable, plastic	common, fine, distinct, 10YR5/4
R	43+						

		Sand Fraction %								
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 22	1	3	2	1	3	5	14	54	32
Bmgj	22- 43	0	4	2	2	4	6	18	50	32
R	43+									

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 22	1.19	6.4	5.5	18.9			
Bmgj	22- 43	1.44	6.4	1.1	13.5			
R	43+							

GRIMSBY SOIL (GMY)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine fine sandy loam and very fine sandy loam

DRAINAGE Imperfect

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	25	19	1	67	33	25	8	VFSL	2.0	5.6	
Bm1	46	59	1	68	36	25	7	VFSL	0.6	5.5	
Bt	19	80	0	61	36	26	12	VFSL	0.3	5.4	
Bm2	19	83	0	76	41	19	5	LFS	0.3	5.7	
Ck	3		0	78	28	20	2	LFS		7.5	6.3

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

GMY ONTARIO 1985 PROFILE NO.EAWSP002

LOCATION Town of Lincoln, Lot 22, Con. B.F, NTS Map Area 30M/4h, 17 TPT 2130 8289

ELEVATION 87 metres

SITE Peach orchard

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping lacustrine sand plain

SLOPE 1.5% simple

SOIL WATER REGIME Well to rapidly drained, conductivity high, saturation period short to very short

STONINESS Nonstony

CLASSIFICATION Brunisolic Gray Brown Luvisol, coarse loamy, mild humid to subhumid

STATUS Modal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-23 (22-26)	10YR3/2m	FSL	weak, coarse, platy	weak to moderate, coarse, subangular blocky	nonsticky, very friable, nonplastic	
Bm	23-60 (30-40)	7.5YR4/4m	LFS	weak to moderate, coarse, subangular blocky	weak to moderate, medium to coarse, subangular blocky	nonsticky, very friable, nonplastic	
Bt1	60-95 (25-35)	7.5YR4/4m	FSL	moderate, coarse, subangular blocky	moderate, medium to coarse, subangular blocky	nonsticky, very friable, nonplastic	
Bt2	95-115	7.5YR4/4m	VFSL	weak to moderate, coarse, platy	weak to moderate, medium to coarse, subangular blocky	nonsticky, very friable, nonplastic	

Horizon	Depth cm	Sand Fraction % Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm³	Porosity %
Ap	0- 23	0	0	2	4	35	33	74	20	6	1	1.17	56
Bm	23- 60	0	1	1	3	34	37	76	19	5	0	1.37	49
Bt1	60- 95	0	0	0	0	40	35	75	13	11	2	1.43	47
Bt2	95-115	0	0	0	0	2	66	68	22	10	3	1.38	49

Horizon	Depth cm	% Moisture Retention (g/g) 0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 23	55.7	44.3	36.7	5.0	31.7	2.80		6.8	6.1	2.5	17.3		
Bm	23- 60	51.0	35.0	23.0	3.0	20.0	3.90		6.6	5.5	0.6	6.9		
Bt1	60- 95	54.3	37.3	21.7	8.0	13.7	0.40		6.6	5.6	0.1	8.3		
Bt2	95-115	58.0	43.3	26.7	9.7	17.0	0.10		6.3	5.9	0.1	12.1		

GRIMSBY SOIL - BROWN PHASE (GMY.B)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly brownish-hued lacustrine fine sandy loam and very fine sandy loam

DRAINAGE Well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	3	20	2	63	30	29	8	VFSL	1.9	5.1	
Bm1	3	46	2	68	30	26	6	VFSL	0.7	4.8	
Bm2	3	75	2	75	26	19	6	FSL	0.5	5.1	
Bm3	3		1	78	26	17	5	LFS	0.5	5.2	

HALDIMAND SOIL (HIM)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine heavy clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	105	15	1	11	2	44	45	SIC	4.1	6.2	0.7
Bmgj	22	31	1	7	1	40	53	C	1.9	6.2	1.2
Btgj	99	35	0	5	1	32	63	HC	1.6	6.2	0.3
Ckgj	99		0	2	0	33	65	HC	0.1	7.6	12.7

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

(1)HIM ONTARIO 1985 PROFILE NO.LWSP013

LOCATION Town of Niagara-on-the-Lake, Lot 7, Con. VIII, NTS Map Area 30M/3g, 17 TPT 4719 7983

ELEVATION 113 metres

SITE Cultivated corn field

LANDFORM AND PARENT MATERIALS Nearly level to gently sloping lacustrine clay plain consisting of sediments with mainly heavy clay and silty clay textures

SLOPE 5% complex

SOIL WATER REGIME Imperfectly drained, conductivity low, saturation period medium to long

STONINESS Nonstony

CLASSIFICATION Gleyed Gray Brown Luvisol, very fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Taxadjunct to Gleyed Brunisolic Gray Brown Luvisol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-19 (17-25)	10YR3/3m	SIC	very weak, coarse, subangular blocky	moderate to strong, fine to medium, granular	slightly sticky, friable and firm, very plastic	
Btgj	19-40 (15-22)	10YR4/3m	C	moderate to strong, coarse, angular blocky	moderate to strong, coarse, subangular blocky	slightly sticky, firm, very plastic	few, fine, faint, 10YR4/4
Ckgj1	40-58 (7-19)	10YR4/2m	HC	weak to moderate, medium to coarse, subangular blocky	weak to moderate, medium to coarse, subangular blocky	slightly sticky, firm, very plastic	few, fine, faint, 10YR4/3
Ckgj2	58+	10YR4/2m	HC	moderate to strong, coarse, angular blocky	moderate to strong, medium to coarse, angular blocky	slightly sticky, firm, very plastic	few, fine, faint, 10YR4/4

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 19	0						8	47	45
Btgj	19- 40	0						3	38	59
Ckgj1	40- 58	0						2	36	62
Ckgj2	58+	1						3	37	61

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 19	1.20	7.0	2.8	19.9	0.6		
Btgj	19- 40	1.38	7.1	1.2	20.6	0.3		
Ckgj1	40- 58	1.46	7.7			10.7	3.0	0.3
Ckgj2	58+	1.49	7.8			15.4	4.2	0.4

(2)HIM ONTARIO 1985 PROFILE NO.EAWSP001

LOCATION	Township of West Lincoln, Lot 15, Con. IX, NTS Map Area 30M/4a, 17 TPT 1500 7175
ELEVATION	191 metres
SITE	Cultivated soybean field
LANDFORM AND PARENT MATERIALS	Nearly level to very gently sloping glaciolacustrine clay plain consisting of sediments with mainly heavy clay and silty clay textures
SLOPE	1.5% complex
SOIL WATER REGIME	Imperfectly drained, conductivity low, saturation period medium to long
STONINESS	Nonstony
CLASSIFICATION	Gleyed Gray Brown Luvisol, very fine clayey, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Taxadjunct to Gleyed Brunisolic Gray Brown Luvisol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-15 (13-23)	10YR4/2m	SIC	massive	massive	sticky, very firm, very plastic	
Btgj1	15-25 (7-10)	10YR5/3m	HC	strong, coarse, angular blocky	strong, coarse, angular blocky	sticky, very firm, very plastic	many, medium, prominent, 10YR5/6
Btgj2	25-38 (9-16)	10YR4/2m	HC	weak, medium, columnar	weak, medium, columnar	sticky, very firm, very plastic	common, fine, distinct, 10YR4/4
Ckgj	38+	10YR4/2m	HC	weak, medium, columnar	weak, medium, columnar	sticky, very firm, very plastic	few, fine, distinct, 10YR4/4

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm3	Porosity %
Ap	0- 15	0						6	44	50	17	1.05	59
Btgj1	15- 25	0						3	30	68	27	1.27	53
Btgj2	25- 38	0						1	29	70	26	1.30	51
Ckgj	38+	0						1	35	64	15	1.35	50

Horizon	Depth cm	% Moisture Retention (g/g) 0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 15	63.0	48.7	42.7	24.3	18.4	10.70		6.6	6.5	3.7	26.1		
Btgj1	15- 25	58.0	49.0	45.7	28.7	17.0	0.10		6.5	6.3	1.2	28.5		
Btgj2	25- 38	58.3	52.7	49.0	32.7	16.3	0.58		7.3	6.8	1.0	29.8		
Ckgj	38+	54.7	47.3	43.3	30.7	12.6	0.13	0.2	7.8	7.7			19.0	4.6

HALDIMAND SOIL - LOAMY PHASE (HIM.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over lacustrine heavy clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	49	18	1	19	9	49	32	SICL	4.0	6.1	0.6
Bmgj	12	27	0	22	13	47	31	CL	1.9	5.8	0.3
IIBtgj	45	42	0	7	2	34	59	C	1.2	5.9	0.1
IICkgj	49		0	3	0	33	64	HC	0.1	7.5	13.4

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

(1)HIM.L ONTARIO 1985 PROFILE NO. LWSSP006

LOCATION Township of West Lincoln, Lot 7, Con. III, NTS Map Area 30M/4a, 17 TPT 1902 6475

ELEVATION 181 metres

SITE Hay - pasture field

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping lacustrine clay plain with heavy clay sediments often overlain by veneer of sediments with lower clay contents

SLOPE 3% complex

SOIL WATER REGIME Imperfectly drained, conductivity low, saturation period medium to long

STONINESS Nonstony

CLASSIFICATION Gleyed Gray Brown Luvisol, very fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Taxadjunct to Gleyed Brunisolic Gray Brown Luvisol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-17 (16-22)	10YR4/3m	SICL	weak, coarse, granular	weak, coarse, granular	slightly sticky, very hard, very plastic	
IIBtgj1	17-28 (10-23)	10YR4/3m	HC	very weak, coarse, subangular blocky	very weak, coarse, subangular blocky	slightly sticky, very hard, very plastic	many, fine prominent, 7.5YR4/6
IIBtgj2	28-42 (10-16)	10YR3/3m	HC	weak to moderate, coarse, subangular blocky	weak to moderate, medium to coarse, subangular blocky	slightly sticky, very hard, very plastic	common, fine, distinct, 10YR4/4
IICkgj	42+	10YR3/2m	HC	moderate, coarse, angular blocky	moderate, medium to coarse, angular blocky	slightly sticky, very hard, very plastic	common, fine, distinct, 10YR4/4

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm^3	Porosity %
Ap	0- 17	0						10	54	36	11	1.36	48
IIBtgj1	17- 28	0						3	35	62	24	1.51	42
IIBtgj2	28- 42	0						1	29	69	24	1.51	45
IICkgj	42+	0						1	36	63	17	1.51	45

Horizon	Depth cm	% Moisture Retention (g/g) 0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 17	56.3	42.3	36.3	16.7	19.6	0.04		5.7	5.4	4.0	14.7		
IIBtgj1	17- 28	59.7	49.0	44.0	29.3	14.7	0.13		6.3	5.4	1.6	20.0		
IIBtgj2	28- 42	61.3	50.3	45.3	30.0	15.3	0.06		7.2	6.6	1.1	25.1		
IICkgj	42+	54.3	44.3	39.7	28.3	11.4	0.13	0.2	7.7	7.6			12.0	3.1

(2)HIM.L ONTARIO 1985 PROFILE NO.MEFP005

LOCATION	Township of West Lincoln, Lot 7, Con. II, NTS Map Area 30M/4a, 17 TPT 1900 6469
ELEVATION	183 metres
SITE	Hay field
LANDFORM AND PARENT MATERIALS	Nearly level to very gently sloping lacustrine clay plain with heavy clay sediments often overlain by veneer of sediments with lower clay contents
SLOPE	4.5% complex
SOIL WATER REGIME	Imperfectly drained, conductivity low, saturation period medium to long
STONINESS	Nonstony
CLASSIFICATION	Gleyed Gray Brown Luvisol, fine clayey, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Taxadjunct to Gleyed Brunisolic Gray Brown Luvisol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-18 (16-18)	10YR4/3m	CL	moderate, fine to medium, subangular blocky	weak to moderate, coarse, granular	slightly sticky, friable, very plastic	
IIBtgj	18-32 (14-18)	10YR4/3m	C	weak to moderate, medium, columnar	weak, medium, columnar	sticky, very firm, very plastic	common, fine, distinct, 10YR4/5
IIBC	32-41 (8-12)	10YR4/2m	HC	moderate, coarse, columnar	moderate, coarse, angular blocky	sticky, very firm, very plastic	common, fine, distinct, 10YR4/4
IICkgj	41-77	10YR4/2m	HC	moderate to strong, coarse, columnar	moderate to strong, coarse, angular blocky	sticky, very firm, very plastic	common, fine, distinct, 10YR5/4,

			Sand Fraction %							
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 18	1	0	1	2	5	12	20	51	29
IIBtgj	18- 32	0						5	38	57
IIBC	32- 41	0						3	36	61
IICkgj	41- 77	0						2	27	71

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 18	1.36	6.2	3.8	13.3			
IIBtgj	18- 32	1.42	6.1	1.0	22.0			
IIBC	32- 41		7.2	0.9	22.7	1.0		
IICkgj	41- 77	1.55	7.8			16.0	4.0	0.2

HOLLY

HOLLY SOIL (HOY)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Organic soil, swamp associated, 40 to 160 cm deep over loamy mineral soil materials

DRAINAGE Very poor

USUAL CLASSIFICATION Terric Mesisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Peat Material and Texture	Stage of Decomposition	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Om1	4	46						woody forest peat	mesic	77.3	5.5	
Om2	3	64						sedge fen peat	mesic	84.0	5.7	
Om3	3	97						sedge fen peat	mesic	70.8	5.7	
IIBg	4	115	0	16	9	55	29	SICL		12.4	6.9	0.7
IICkg	3		0	30	16	52	18	SIL		0.2	7.3	28.4

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

HOY ONTARIO 1985 PROFILE NO. LWS30

LOCATION Town of Fort Erie, Lot 33, Con. B.F, NTS Map Area 30L/14a, 17 TPT 5488 4644

ELEVATION 177 metres

SITE Wetland consisting of reeds, tall sedge, grasses and some small shrubs

LANDFORM AND PARENT MATERIALS Basin swamp with organic sediments consisting of woody sedge fen peat underlain by sedge fen peat. Loamy mineral sediment occurs at 149 cm depth

SLOPE 0.5 % simple

SOIL WATER REGIME Very poorly drained, conductivity high, saturation period prolonged

STONINESS Nonstony

CLASSIFICATION Terric Mesisol, mesic, euic, mild, peraquic, loamy

STATUS Undecided. pH of upper horizons is somewhat higher than normal

MORPHOLOGICAL DESCRIPTION, CHEMICAL AND PHYSICAL ANALYSES

Horizon	Depth cm	Colour (moist)	Peat Material and Texture	Stage of Decomposition	von Post Scale	Woody Material Volume %	Organic Matter %	pH $CaCl_2$	$CaCO_3$ %
Om1	0-50	10YR2/1	woody sedge fen peat	mesic	5	<10	81.6	6.0	
Om2	50-74	10YR2/2	sedge fen peat	mesic	5	<10	81.3	6.4	
Om3	74-108	10YR2/1	sedge fen peat	mesic	5	<10	63.7	6.1	
Om4	108-149	2.5Y3/2	sedge fen peat	mesic	5	<10	35.6	5.3	
IIBg	149-170	2.5Y3/2	SICL				19.2	7.0	
IICkg	170+	5Y5/1	SIL					7.3	28.7

JEDDO SOIL (JDD)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly clay loam till

DRAINAGE Poor

USUAL CLASSIFICATION Humic Luvic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	19	17	2	22	10	46	32	CL	4.3	6.1	0.8
Bg	11	40	3	25	11	40	35	CL	1.1	6.6	0.4
Btg	6	44	2	17	8	38	45	C	1.4	6.1	0.3
Ckg	11		4	19	6	42	39	SICL	0.2	7.6	12.6

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

JDD ONTARIO 1985 PROFILE NO.LWSP007

LOCATION Town of Niagara-on-the-Lake, Lot 125, Con. V, NTS Map Area 30M/3g, 17 TPT 5188 8408

ELEVATION 98 metres

SITE Cultivated corn field

LANDFORM AND PARENT MATERIALS Level to nearly level clay till plain

SLOPE 1% simple

SOIL WATER REGIME Poorly drained, conductivity medium to low, saturation period long

STONINESS Nonstony

CLASSIFICATION Orthic Humic Gleysol, fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Taxadjunct to Humic Luvic Gleysol. Clay contents of B horizon are higher than normal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-13 (10-17)	10YR3/2m	SICL	weak, coarse, granular	weak, medium to coarse, granular	slightly sticky, hard, very plastic	
Bg1	13-24 (7-16)	2.5Y4/2m	SIC	very weak, coarse, subangular blocky	weak, medium to coarse, subangular blocky	slightly sticky, very hard, very plastic	many, medium, prominent, 10YR4/6
Bg2	24-49 (24-28)	10YR4/2m	SIC	very weak, coarse, subangular blocky	very weak, coarse, subangular blocky	slightly sticky, very hard, very plastic	many, medium, prominent, 7.5YR4/6
Ckg	49+	10YR4/2m	SICL	very weak, coarse, subangular blocky	weak, medium to coarse, subangular blocky	slightly sticky, very hard, very plastic	many, medium, prominent, 10YR4/6

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 13	6	3	2	2	3	7	17	50	34
Bg1	13- 24	0	3	2	1	3	4	12	42	46
Bg2	24- 49	0	3	2	1	2	4	12	43	45
Ckg	49+	1	1	1	2	3	4	11	50	39

Horizon	Depth cm	Bulk Density g/cm³	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 13	1.11	7.1	4.4	19.5	1.0		
Bg1	13- 24	1.49	6.3	0.9	17.4			
Bg2	24- 49	1.64	6.4	0.5	20.7			
Ckg	49+	1.74	7.6			9.0	1.5	0.3

JEDDO SOIL - COARSE PHASE (JDD.C)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm sandy textures over clay loam till

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	15	8	62	12	24	14	FSL	2.2	7.2	1.2
Bg	1	27	7	61	13	20	19	FSL	0.7	6.8	0.0
IIBg	1	43	1	9	0	46	45	SIC	0.6	7.3	0.7
IICkg	1		2	8	0	52	40	SIC		7.7	9.6

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps

JEDDO SOIL - LOAMY PHASE (JDD.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over clay loam till

DRAINAGE Poor

USUAL CLASSIFICATION Humic Luvic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	19	21	2	32	15	43	25	L	3.8	6.7	0.5
IIBtg	10	49	2	16	6	42	42	SICL	0.7	6.7	0.1
IIBmgj	6	51	2	29	10	36	35	CL	0.8	6.5	0.1
IICkg	14		3	14	4	45	41	SIC		7.6	10.5

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

JDD.L ONTARIO 1985 PROFILE NO.EAWP012

LOCATION	Town of Niagara-on-the-Lake, Lot 124, Con. V, NTS Map Area 30M/3g, 17 TPT 5151 8481
ELEVATION	95 metres
SITE	Alfalfa hay field
LANDFORM AND PARENT MATERIALS	Level to nearly level clay till plain
SLOPE	0.5% simple
SOIL WATER REGIME	Poorly drained, conductivity medium to low, saturation period long
STONINESS	Nonstony
CLASSIFICATION	Humic Luvic Gleysol, fine clayey, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Taxadjunct to Orthic Humic Gleysol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-19 (17-21)	10YR3/3m	L	moderate, coarse, granular	moderate, coarse, granular	sticky, extremely hard, plastic	
IIBtg1	19-29 (9-15)	10YR4/2m	C	moderate, fine to medium, columnar	moderate, medium to coarse, angular blocky	sticky, extremely hard, plastic	many, medium, prominent, 10YR4/6
IIBtg2	29-56 (23-30)	10YR4/1m	SIC	moderate, fine to medium, columnar	moderate, medium to coarse, angular blocky	sticky, extremely hard, plastic	many, medium, prominent, 10YR4/6
IICkg	56+	10YR4/1m	SICL	moderate, fine to medium, columnar	moderate, medium to coarse, angular blocky	sticky, extremely hard, plastic	common, medium, prominent, 10YR4/6

			Sand Fraction %							
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0-19	3	5	3	3	8	11	29	47	24
IIBtg1	19-29	2	1	1	2	4	6	15	38	47
IIBtg2	29-56	2	2	3	2	3	6	16	45	39
IICkg	56+	2	2	2	2	4	6	16	50	34

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0-19	1.34	6.7	3.2	15.9			
IIBtg1	19-29	1.49	5.5	0.7	17.3			
IIBtg2	29-56	1.58	7.0	0.2	19.1	1.0		
IICkg	56+	1.78	7.7			12.0	2.4	0.4

JEDDO SOIL - LOAMY RED PHASE (JDD.LR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued clay loam till

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	23	6	42	16	36	22	L	2.9	6.7	0.2
IIBtg	5	48	2	23	9	39	39	CL	0.8	6.7	0.2
IICkg	6		6	22	9	43	35	CL		7.5	11.6

JEDDO SOIL - RED PHASE (JDD.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued clay loam till

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	18	2	19	7	44	37	SICL	4.9	6.3	0.1
Bmgj	3	37	2	20	8	39	41	C	1.2	7.2	1.9
Bg	3	43	3	17	6	40	43	SIC	1.1	6.1	0.5
Ckg	4		1	16	5	40	44	SIC	0.1	7.7	13.0

JEDDO SOIL - RED WASHED (JDD.RW)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Washed reddish-hued clay loam till, modified by lacustrine processes

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	8	26	7	31	13	44	25	L	4.6	6.6	1.0
Bg	3	42	7	26	11	44	30	CL	0.6	7.1	2.5
Bmgj	4	62	6	35	12	40	25	L	0.5	6.2	0.3
Ckg	7		4	29	11	49	22	SIL		7.6	11.4

JEDDO SOIL - WASHED PHASE (JDD.W)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Washed clay loam till, modified by lacustrine processes

DRAINAGE Poor

USUAL CLASSIFICATION Humic Luvic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	12	18	2	31	17	45	24	L	3.6	6.6	0.3
Btg1	8	41	3	28	12	44	28	CL	0.8	6.8	0.3
Btg2	6	53	2	27	12	42	31	CL	0.6	6.9	0.2
Ckg	10		6	27	10	51	22	SIL	0.1	7.6	10.9

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

(1)JDD.W ONTARIO 1985 PROFILE NO.MEFP013

LOCATION Town of Niagara-on-the-Lake, Lot 165, Con. [illegible]NTS Map Area 30M/3g, 17 TPT 5036 8655

ELEVATION 91 metres

SITE Vineyard

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping washed clay till plain

SLOPE 0.5% simple

SOIL WATER REGIME Poorly drained, conductivity medium, saturation period medium to long

STONINESS Slightly stony

CLASSIFICATION Humic Luvic Gleysol, fine loamy, alkaline, strongly calcareous, mild humid to subhumid

STATUS Modal. Clay contents are significantly lower than in normal Jeddo soils

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-18 (17-19)	10YR3/2m	L	moderate, medium to coarse, granular	weak to moderate, coarse, granular	slightly sticky, very friable, slightly plastic	
Btgj	18-44 (23-26)	5YR5/3m	CL	weak to moderate, medium, columnar	weak to moderate, medium to coarse, columnar	slightly sticky, friable, plastic	many, fine, prominent, 7.5YR5/6
Btg	44-61 (12-20)	5YR5/2m	L	weak, coarse, subangular blocky	weak, coarse, subangular blocky	slightly sticky, friable, plastic	many, fine, prominent, 7.5YR5/6
Ckg	61+	5YR5/2m	L	moderate to strong, coarse, platy	weak to moderate, coarse, platy	slightly sticky, friable, plastic	common, fine, prominent, 7.5YR5/6

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 18	3	2	2	2	7	16	29	50	21
Btgj	18- 44	1	4	2	2	7	15	30	41	28
Btg	44- 61	1	2	2	2	7	15	28	47	25
Ckg	61+	4	5	3	3	7	14	33	50	17

Horizon	Depth cm	Bulk Density g/cm³	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 18	1.24	7.0	4.4	19.6	1.0		
Btgj	18- 44	1.49	7.0	0.5	18.3			
Btg	44- 61	1.55	7.3	0.3	18.9	1.0		
Ckg	61+	1.63	7.9		54.2	14.0	2.2	0.3

(2)JDD.W ONTARIO 1985 PROFILE NO.MSKP001

LOCATION	Town of Grimsby, Lot 12, Con. II, NTS Map Area 30M/4h, 17 TPT 1575 8238
ELEVATION	191 metres
SITE	Forage field
LANDFORM AND PARENT MATERIALS	Nearly level to very gently sloping washed till moraine with soil materials having predominantly clay loam and loam textures
SLOPE	3% simple
SOIL WATER REGIME	Poorly drained, conductivity medium to low, saturation period medium
STONINESS	Slighty stony
CLASSIFICATION	Humic Luvic Gleysol, fine loamy, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Modal. Clay contents are significantly lower than in normal Jeddo soils

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-18 (15-25)	10YR3/3m	L	strong, coarse, angular blocky	moderate, coarse, angular blocky	nonsticky, friable, plastic	
Bmgj	18-26 (0-8)	10YR5/3m	L	weak to moderate, coarse, subangular blocky	weak to moderate, medium, subangular blocky	slightly sticky, friable, slightly plastic	common, medium, prominent, 10YR5/6
Btg	26-70 (36-55)	10YR4/2m	CL	moderate to strong, coarse, angular blocky	weak, coarse, subangular blocky	slightly sticky, firm, slightly plastic	many, medium, prominent, 10YR5/6
Ckg	70+	.0YR4/2m	SIL	weak, coarse, subangular blocky	weak, coarse, subangular blocky	slightly sticky, firm, slightly plastic	many, medium, prominent, 10YR5/8

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 18	2	3	4	7	9	8	31	50	19
Bmgj	18- 26	3	7	6	6	8	7	34	48	18
Btg	26- 70	3	5	4	4	6	8	25	49	27
Ckg	70+	4	3	2	2	5	6	18	57	25

Horizon	Depth cm	Bulk Density g/cm³	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 18	1.25	5.9	2.9	10.7			
Bmgj	18- 26	1.58	5.7	0.6	7.6			
Btg	26- 70	1.63	6.9	0.2	14.0			
Ckg	70+	1.67	7.7			16.0	3.1	0.2

(3)JDD.W ONTARIO 1985 PROFILE NO.LWSSP009

LOCATION	Town of Lincoln, Lot 9, Con. II, NTS Map Area 30M/3e, 17 TPT 2705 8171
ELEVATION	88 metres
SITE	Apple orchard
LANDFORM AND PARENT MATERIALS	Nearly level to very gently sloping clay till plain
SLOPE	1.5% complex
SOIL WATER REGIME	Poorly drained, conductivity medium, saturation period medium to long
STONINESS	Nonstony
CLASSIFICATION	Orthic Humic Gleysol, fine loamy, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Taxadjunct to Humic Luvic Gleysol. Clay contents are much lower than in normal Jeddo soils

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-19 (9-35)	10YR3/2m	CL	weak to moderate, medium, subangular blocky	moderate, fine to medium, subangular blocky	slightly sticky, firm, slightly plastic	
Bg	19-49 (5-40)	2.5Y4/2m	L	very weak, very coarse, subangular blocky	weak, medium to coarse, subangular blocky	slightly sticky, firm, plastic	many, medium, prominent, 10YR4/6
Ckg	49+	2.5Y4/2m	SIL	very weak, coarse, subangular blocky	very weak, medium to coarse, subangular blocky	slightly sticky, very firm, plastic	many, medium, prominent, 10YR5/6

		Sand Fraction %											
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm³	Porosity %
Ap	0- 19	3	2	2	3	4	22	32	41	27	13	1.29	50
Bg	19- 49	6	5	4	4	5	23	40	36	24	12	1.56	42
Ckg	49+	4	2	2	3	6	8	21	56	22	7		

		% Moisture Retention (g/g)											
Horizon	Depth cm	0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 19	59.7	42.0	35.3	15.3	20.0	0.90		6.9	6.8	3.9	17.1		
Bg	19- 49	57.0	46.0	39.3	20.7	18.6	0.08		7.2	7.2	0.7	18.1	1.0	
Ckg	49+							0.3	8.0	7.6			14.0	2.3

LINCOLN SOIL (LIC)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine heavy clay

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	190	15	0	10	2	41	49	C	5.0	5.9	0.3
Bg1	155	40	0	5	1	32	63	HC	1.7	6.1	0.3
Bg2	61	56	0	4	1	31	65	HC	1.2	6.3	0.3
Ckg	178		0	3	0	33	64	HC	0.1	7.6	13.9

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

LIC ONTARIO 1985 PROFILE NO.EWPSP006

LOCATION Township of West Lincoln, Lot 28, Con. IX, NTS Map Area 30M/4g, 17 TPT 1045 7566

ELEVATION 197 metres

SITE Cultivated corn field

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping lacustrine clay plain

SLOPE 1% simple

SOIL WATER REGIME Poorly drained, conductivity low, saturation period long to prolonged

STONINESS Nonstony

CLASSIFICATION Humic Luvic Gleysol, very fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Taxadjunct to Orthic Humic Gleysol. Deeper than normal to top of C horizon

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-15 (8-16)	10YR3/2m	C	weak, coarse granular	massive	sticky, firm, plastic	
Btg1	15-34 (14-22)	10YR4/2m	C	massive	massive	sticky, very firm, very plastic	many, fine, prominent, 10YR4/6
Btg2	34-62 (20-28)	10YR4/2m	HC	weak, coarse, subangular blocky	massive	sticky, very firm, very plastic	few, fine, prominent, 10YR5/6
Ckg	62+	10YR5/2m	SIC	weak to moderate, medium to coarse, subangular blocky	very weak, medium to coarse, subangular blocky	sticky, very firm, very plastic	many, medium, prominent, 10YR4/6

Horizon	Depth cm	Sand Fraction % Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm3	Porosity %
Ap	0- 15	1	1	2	3	4	2	12	38	50	19	1.35	52
Btg1	15- 34	0						6	39	55	30	1.49	44
Btg2	34- 62	0						3	34	63	26	1.22	44
Ckg	62+	0						2	48	50	12	1.51	44

Horizon	Depth cm	% Moisture Retention (g/g) 0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 15	64.0	50.7	42.3	25.0	17.3	1.40		6.3	6.4	4.5	29.6		
Btg1	15- 34	60.7	51.7	47.0	30.3	16.7	0.13		6.2	6.2	1.0	18.9		
Btg2	34- 62	61.7	55.3	50.0	33.7	16.3	0.32		7.2	6.8	0.9	23.4		
Ckg	62+	51.7	45.0	40.0	29.0	11.0	0.13	0.2	8.0	7.9			24.0	5.4

LINCOLN SOIL - LOAMY PHASE (LIC.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over lacustrine heavy clay

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	60	19	1	19	8	49	32	SICL	4.4	6.0	0.3
Bmgj	11	27	0	19	10	50	31	SICL	1.5	5.9	0.0
IIBg	59	41	0	8	2	35	57	C	1.2	6.3	0.2
IICkg	59		0	3	0	34	63	HC	0.2	7.6	15.8

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

LIC.L ONTARIO 1985 PROFILE NO.MEFP008

LOCATION Town of Niagara-on-the-Lake, Lot 1, Con. IX, NTS Map Area 30M/3g, 17 TPT 4973 7985

ELEVATION 119 metres

SITE Abandoned farmland

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping glaciolacustrine clay plain

SLOPE 2.5% complex

SOIL WATER REGIME Poorly drained, conductivity low, saturation period long

STONINESS Nonstony

CLASSIFICATION Humic Luvic Gleysol, very fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Taxadjunct to Orthic Humic Gleysol. Deeper than normal to top of C horizon

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-15 (14-16)	10YR3/1m	SICL	weak, coarse, granular	weak, coarse, granular	sticky, friable, plastic	
IIBtg1	15-31 (14-16)	10YR4/2m	C	weak, medium, columnar	moderate, coarse, subangular blocky	sticky, friable, very plastic	common, medium, prominent, 10YR5/8
IIBtg2	31-53 (20-24)	10YR4/2m	HC	massive	massive	sticky, firm, very plastic	common, fine, prominent, 10YR4/5
IICkg	53+	10YR5/1m	HC	weak, coarse, columnar	weak, coarse, columnar	sticky, firm, very plastic	common, fine, prominent, 10YR5/4

		Sand Fraction %								
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 15	1	4	3	3	3	5	18	44	38
IIBtg1	15- 31	0						6	34	59
IIBtg2	31- 53	0						4	32	64
IICkg	53+	0						3	36	61

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 15	1.31	6.4	4.1	19.4			
IIBtg1	15- 31	1.45	4.9	1.0	18.9			
IIBtg2	31- 53	1.44	6.3	0.9	26.9			
IICkg	53+	1.52	7.8			15.0	4.1	0.5

LOCKPORT SOIL (LKP)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued silty clay loam at least 1 m thick over Queenston shale bedrock

DRAINAGE Well

USUAL CLASSIFICATION Orthic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	16	2	21	5	56	23	SIL	3.9	7.0	1.0
Btgj	1	51	0	11	3	52	37	SICL	0.6	5.9	0.0
Ck	1		0	20	6	60	20	SIL	0.0	7.5	6.0

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps

LOCKPORT SOIL - COARSE PHASE (LKP.C)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm sandy textures over LKP soils

DRAINAGE Well

USUAL CLASSIFICATION Orthic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	28	2	58	8	29	13	SL	2.0	5.4	0.0
Ae	1	45	2	71	7	20	9	SL	0.6	5.8	0.0
IIBt	1	75	0	5	0	53	42	SIC	0.3	6.5	0.0
IICk	1		0	3	0	61	36	SICL		7.5	5.2

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps

LOCKPORT SOIL - LOAMY PHASE (LKP.L)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over LKP soils

DRAINAGE Well

USUAL CLASSIFICATION Orthic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	5	19	1	29	7	47	24	L	2.8	5.9	0.0
IIBt	4	42	0	7	1	49	44	SIC	0.8	6.0	0.0
IICk	4		0	12	4	58	32	SICL		7.5	7.0

LORRAINE SOIL (LRR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Organic soil, fen-associated, 40 to 160 cm deep over clayey mineral soil materials

DRAINAGE Very poor

USUAL CLASSIFICATION Terric Mesisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Peat Material and Texture	Stage of Decomposition	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Om1	5	23						woody fen peat	mesic	73.3	5.0	
Om2	5	42						sedge fen peat	mesic	80.2	4.8	
Om3	4	66						woody fen peat	mesic	76.7	4.9	
IIBg	3		0	6	3	50	44	SIC		2.0	6.3	

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

LRR ONTARIO 1985 PROFILE NO. LWS25

LOCATION City of Port Colborne, Lot 11, Con. III, NTS Map Area 30L/14g, 17 TPT 4981 5345

ELEVATION 183 metres

SITE Humberstone Marsh; alder or woody shrub with occasional maple

LANDFORM AND PARENT MATERIALS Horizontal fen with organic sediments consisting of woody fen peat. Clayey mineral sediment occurs at 74 cm depth

SLOPE 0.5 % simple

SOIL WATER REGIME Very poorly drained, conductivity high, saturation period prolonged

STONINESS Nonstony

CLASSIFICATION Terric Mesisol, mesic, euic, mild, peraquic, clayey

STATUS Undecided. Underlying mineral soil has heavier textures than usual

MORPHOLOGICAL DESCRIPTION, CHEMICAL AND PHYSICAL ANALYSES

Horizon	Depth cm	Colour (moist)	Peat Material and Texture	Stage of Decomposition	von Post Scale	Woody Material Volume %	Organic Matter %	pH $CaCl_2$	$CaCO_3$ %
Om1	0-29	5YR2.5/1	woody fen peat	mesic	5	<10	73.5	5.0	
Om2	29-45	5YR2.5/1	woody fen peat	mesic	5	<10	78.3	5.0	
Om3	45-74	5YR2.5/1	woody fen peat	mesic	5	<10	64.8	5.1	
IICkg	74+	5Y4/1	HC				1.6	7.0	2.7

MALTON SOIL (MAT)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm lacustrine silty clay over clay loam till

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	17	21	0	14	4	48	38	SICL	4.9	6.7	1.0
Bg	13	45	0	9	2	49	42	SIC	1.1	6.6	0.5
IICkg	13		6	16	4	46	38	SICL	0.2	7.7	12.6

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

MAT ONTARIO 1985 PROFILE NO.EAWSP015

LOCATION Town of Grimsby, Lot 3, Con. IV, NTS Map Area 30M/4h, 17 TPT 1865 7928

ELEVATION 191 metres

SITE Hay field

LANDFORM AND PARENT MATERIALS Nearly level till plain overlain by 40 to 100 cm of clayey lacustrine sediments

SLOPE 1% simple

SOIL WATER REGIME Poorly drained, conductivity low, saturation period long to prolonged

STONINESS Nonstony

CLASSIFICATION Orthic Humic Gleysol, fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Modal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-26 (25-27)	10YR3/3m	SICL	moderate, medium, subangular blocky	moderate, fine to medium, subangular blocky	sticky, friable, plastic	
Bg	26-50 (23-25)	10YR5/1m	SIC	moderate, medium, columnar	moderate, medium, columnar	sticky, firm, very plastic	many, coarse, prominent, 10YR5/6
Ckg	50-85 (34-36)	10YR5/1m	SIC	modcrate to strong, medium, columnar	moderate to strong, medium, columnar	sticky, firm, very plastic	many, coarse, prominent, 10YR5/6
IICkg	85+	10YR5/1m	SIC	weak to moderate, coarse, columnar	moderate, coarse, angular blocky	sticky, firm, very plastic	many, coarse, prominent, 10YR5/6

Horizon	Depth cm	Sand Fraction % Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm³	Porosity %
Ap	0- 26	0						7	60	33	16	1.24	51
Bg	26- 50	0						2	53	45	19	1.43	46
Ckg	50- 85	0						3	53	44	12	1.53	43
IICkg	85+	6	2	2	2	4	3	13	43	44	11	1.52	44

Horizon	Depth cm	% Moisture Retention (g/g) 0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 26	53.3	43.0	38.0	18.3	19.7	0.90		5.8	5.8	4.7	20.1		
Bg	26- 50	50.7	45.0	40.7	25.0	15.7	0.80		7.0	6.5	0.6	25.9		
Ckg	50- 85	48.7	42.7	39.0	27.7	11.3	0.56	0.4	7.9	7.8		141.4	18.0	3.3
IICkg	85+	52.0	39.7	28.7	11.3	17.4	0.90	0.5	7.9	7.8			19.0	3.4

MALTON SOIL - LOAMY RED PHASE (MAT.LR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm reddish-hued loamy textures over MAT soils

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	28	1	16	8	55	29	SICL	4.2	5.9	
IIBg	1	60	0	7	0	53	41	SIC	2.6	5.3	
IIBmgj	1	72	0	6	0	52	41	SIC	0.9	7.1	0.8
IIICkg	1		3	21	2	45	34	CL		7.6	26.7

MALTON SOIL - RED PHASE (MAT.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued lacustrine silty clay over clay loam till

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	7	18	0	17	8	44	39	SICL	6.7	6.1	
Bg1	5	38	0	11	4	45	44	SIC	1.4	6.2	
Bg2	3	56	0	12	5	41	47	SIC	0.7	7.0	2.6
IICkg	7		5	21	6	43	36	CL		7.7	16.6

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

MAT.R ONTARIO 1985 PROFILE NO. EAWSP019

LOCATION	Town of Fort Erie, Lot 3, Con. III, NTS Map Area 30L/15e, 17 TPT 6711 5295
ELEVATION	192 metres
SITE	Idle scrubland
LANDFORM AND PARENT MATERIALS	Nearly level till plain overlain by 40 to 100 cm of lacustrine clay sediments
SLOPE	1% simple
SOIL WATER REGIME	Poorly drained, conductivity low, saturation period long
STONINESS	Nonstony
CLASSIFICATION	Orthic Humic Gleysol, fine clayey/loamy, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Modal. Somewhat lower clay contents in IICkg horizon than normal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-19 (15-23)	10YR3/2m	SICL	moderate to strong, medium, subangular blocky	moderate to strong, fine to medium, subangular blocky	slightly sticky, friable, plastic	
Bg	19-43 (19-28)	5YR5/3m	SIC	moderate, coarse columnar	moderate, coarse, angular blocky	sticky, firm, very plastic	many, medium, prominent, 7.5YR5/8
Ckg	43-87 (44-49)	5Y5/1m	SICL	moderate, coarse, columnar	moderate, coarse, angular blocky	sticky, firm, very plastic	many, coarse, prominent, 10YR5/6
IICkg	87+	5GY6/1m	CL	weak to moderate, coarse, angular blocky	weak to moderate, medium, platy	slightly sticky, firm, plastic	many, coarse, prominent, 7.5YR5/6

			Sand Fraction %										
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm^3	Porosity %
Ap	0-19	1	1	1	2	5	7	16	46	38	18	0.97	61
Bg	19-43	1	1	1	2	4	6	13	45	42	17	1.44	46
Ckg	43-87	1	2	1	2	3	5	13	50	38	11	1.62	39
IICkg	87+	9	3	3	4	8	11	29	44	26	9	1.50	44

		% Moisture Retention (g/g)											
Horizon	Depth cm	0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0-19	60.7	47.0	39.3	17.3	22.0	3.50		6.7	6.5	6.0	23.9		
Bg	19-43	49.7	39.7	35.3	24.3	11.0	0.32		7.6	7.4	0.5	21.0	6.6	
Ckg	43-87	44.3	34.3	30.3	22.3	8.0		0.4	7.9	7.7			22.8	0.9
IICkg	87+							0.9	7.6	7.7			26.6	0.5

MALTON SOIL - WASHED PHASE (MAT.W)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm lacustrine silty clay over washed clay loam till

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	15	0	10	3	47	43	SIC	5.3	6.6	
Bmgj	1	33	0	8	0	45	47	SIC	1.9	6.1	
Btg	1	44	0	5	0	41	54	SIC	1.0	5.5	
IIBC	1	57	6	26	9	41	33	CL	0.5	7.1	0.6
IICkgj	1		9	29	10	47	24	L		7.6	7.8

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps

MAPLEWOOD SOIL (MPW)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over lacustrine silty clay

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	25	23	0	52	31	32	16	L	4.1	6.9	1.2
Bg1	25	43	1	48	29	35	17	L	0.9	7.0	3.9
Bg2	5	57	0	54	36	32	14	VFSL	0.3	7.5	12.8
IICkg	35		0	19	11	51	30	SICL		7.6	21.7

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

MPW ONTARIO 1985 PROFILE NO.EWPP001

LOCATION Township of West Lincoln, Lot 1, Con. VI, NTS Map Area 30M/3d, 17 TPT 3110 7145

ELEVATION 180 metres

SITE Grazed woodlot

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping lacustrine plain with 40 to 100 cm of loamy soil over dominantly clayey sediments

SLOPE 1% complex

SOIL WATER REGIME Poorly drained, conductivity medium to low, saturation period long

STONINESS Nonstony

CLASSIFICATION Humic Luvic Gleysol, fine loamy over fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Taxadjunct to Orthic Humic Gleysol. IIBg horizon has higher silt content than normal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ah	0-20 (15-28)	10YR2/1m	SICL	moderate to strong, medium, granular	moderate, fine to medium, granular	slightly sticky, very friable, plastic	
Acgj	20-39 (12-23)	10YR5/3m	SL	weak to moderate, medium to coarse, subangular blocky	weak to moderate, medium to coarse, subangular blocky	slightly sticky, firm, plastic	many, medium, prominent, 7.5YR5/6
Btg	39-50 (5-11)	10YR4/2m	SICL	moderate, coarse, subangular blocky	moderate, coarse, subangular blocky	sticky, very firm, very plastic	many, medium, prominent, 10YR4/6
Bg	50-59 (8-20)	10YR4/2m	SIL	moderate, coarse, subangular blocky	moderate, coarse, subangular blocky	sticky, very firm, very plastic	many, medium, prominent, 10YR4/6
IIBg	59-89 (14-24)	10YR4/2m	SICL	moderate, coarse, subangular blocky	moderate, coarse, subangular blocky	sticky, firm, very plastic	many, medium, prominent, 10YR4/6
IICkg	89+	2.5Y5/2m	SICL	moderate, coarse, subangular blocky	moderate, coarse, subangular blocky	sticky, very firm, very plastic	many, medium, prominent, 2.5Y5/6

Horizon	Depth cm	Sand Fraction % Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ah	0- 20	0	1	2	2	4	10	19	53	28
Aegj	20- 39	0	5	3	2	4	13	27	54	20
Btg	39- 50	0	1	2	1	2	3	9	56	35
Bg	50- 59	0						7	69	24
IIBg	59- 89	0						5	65	30
IICkg	89+	0						2	59	39

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ah	0- 20	0.72	5.8	11.4	49.7			
Aegj	20- 39	1.42	5.1	0.6	11.4			
Btg	39- 51	1.50	5.6	0.4	18.3			
Bg	50- 59	1.51	5.8	0.3	15.7			
IIBg	59- 89	1.51	6.4	0.5	18.2			
IICkg	89+	1.42	7.5			23.0	7.5	0.2

MAPLEWOOD SOIL - HEAVY PHASE (MPW.H)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over lacustrine heavy clay

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	18	0	43	23	34	23	L	3.9	5.8	
Btgj	3	52	0	28	13	38	34	CL	1.1	5.6	
Bg	5	55	0	51	25	28	21	L	0.6	6.2	
IICkg	4		0	3	0	28	69	HC		7.7	16.0

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps

MAPLEWOOD SOIL - RED PHASE (MPW.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued loamy textures over lacustrine silty clay

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	5	30	1	41	23	38	21	L	3.1	6.4	0.2
Bg	3	56	2	54	30	29	17	SL	0.7	7.0	0.3
IICkg	3		0	6	0	43	51	SIC		7.6	17.3

MAPLEWOOD SOIL - TILL PHASE (MPW.T)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over clay loam till

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	5	19	1	41	18	40	19	L	3.3	6.3	0.7
Bg	7	51	2	36	14	41	23	L	0.7	6.7	0.9
IICkg	6		4	24	9	44	32	CL		7.5	14.3

MAPLEWOOD SOIL - TILL RED PHASE (MPW.TR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued loamy textures over clay loam till

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	2	26	1	24	15	49	27	SIL	4.3	6.2	
Bg	3	50	1	23	13	54	23	SIL	0.9	6.6	

MORLEY

MORLEY SOIL (MOY)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued silty clay loam at least 1 m thick over Queenston shale bedrock

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	7	20	0	13	4	42	45	SIC	4.5	6.7	0.6
Bg1	7	48	0	12	3	43	45	SIC	1.1	6.9	0.2
Bg2	4	85	0	12	5	48	40	SICL	0.4	7.3	1.0
Ckg	2		0	3	0	64	33	SICL		7.7	1.6
R	7										

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

MOY ONTARIO 1985 PROFILE NO. EWPP007

LOCATION Town of Lincoln, Lot 6, Con. III, NTS Map Area 30M/3e, 17 TPT 2815 8020

ELEVATION 95 metres

SITE Idle grass area beside vineyard

LANDFORM AND PARENT MATERIALS Level to nearly level shale bedrock plain overlain by dominantly clayey reddish coloured sediments

SLOPE 0.5% simple

SOIL WATER REGIME Poorly drained, conductivity medium to low, saturation period medium to long

STONINESS Nonstony

CLASSIFICATION Humic Luvic Gleysol, fine clayey, alkaline, weakly calcareous, mild humid to subhumid

STATUS Taxadjunct to Orthic Humic Gleysol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-33 (26-33)	10YR3/2m	SIC	strong, very coarse, prismatic	moderate, medium to coarse, subangular blocky	slightly sticky, very firm, very plastic	
Btg	33-46 (0-23)	5YR4/2m	SIC	strong, very coarse, prismatic	strong, coarse, angular blocky	sticky, very firm, very plastic	common, fine, distinct, 5YR4/3
Bm	46-68 (11-31)	5YR4/3m	SICL	strong, very coarse, prismatic	massive	slightly sticky, firm, very plastic	
Ck	68+	2.5YR5/4m	SICL	massive	strong, coarse, subangular blocky	slightly sticky, very firm, very plastic	

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 33	0						9	44	48
Btg	33- 46	0						3	41	56
Bm	46- 68	0						6	60	34
Ck	68+	0	3	3	2	3	4	14	58	28

Horizon	Depth cm	Bulk Density g/cm³	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 33	1.12	6.9	5.6	28.0			
Btg	33- 46	1.59	7.2	2.1	22.7	1.0		
Bm	46- 68	1.76	7.4	0.4	9.6	1.0		
Ck	68+	1.62	7.7			2.0	1.0	0.2

MORLEY SOIL - SHALLOW PHASE (MOY.S)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 50 to 100 cm reddish-hued silty clay loam over Queenston shale bedrock

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	18	1	15	3	51	34	SICL	3.8	6.8	0.5
Bg1	5	52	0	9	2	54	37	SICL	0.8	5.6	0.2
Bg2	2	60	2	14	2	48	38	SICL	0.8	5.4	0.1
Ckg	3	75	1	17	4	58	25	SIL	0.3	7.6	4.3
R	6										

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

MOY.S ONTARIO 1985 PROFILE NO. EAWP017

LOCATION Town of Grimsby, Lot A, Con. I, NTS Map Area 30M/4h, 17 TPT 2065 8221

ELEVATION 99 metres

SITE Vineyard

LANDFORM AND PARENT MATERIALS Very gently sloping shale bedrock plain, overlain by dominantly clayey reddish coloured sediments

SLOPE 1% complex

SOIL WATER REGIME Poorly drained, conductivity medium to low, saturation period medium to long

STONINESS Nonstony

CLASSIFICATION Orthic Luvic Gleysol, fine clayey, shallow lithic, neutral, weakly calcareous, mild humid to subhumid

STATUS Taxadjunct to Orthic Humic Gleysol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-10 (9-18)	5YR3/3m	SICL	moderate to strong, coarse, columnar	weak, coarse, subangular blocky	sticky, firm, very plastic	
Aeg	10-20 (0-18)	5YR4/6m	SICL	moderate to strong, coarse, columnar	weak, coarse, subangular blocky	sticky, firm, very plastic	many, medium, prominent, 7.5YR5/6
Btg	20-41 (14-28)	2.5YR3.5/3m	SIC	moderate to strong, coarse, columnar	weak to moderate, medium to coarse, subangular blocky	sticky, firm, very plastic	common, fine prominent, 5YR4/6
IIBg	41-55 (6-20)	5YR3.5/3m	SIL	moderate to strong, medium to coarse, angular blocky	weak to moderate, medium to coarse, subangular blocky	sticky, firm, very plastic	common, fine prominent, 5YR4/6
IICkg	55-65 (7-17)	2.5YR4/3m	SIL	moderate to strong, medium to coarse, angular blocky	strong, medium, angular blocky	sticky, firm, plastic	common, medium prominent, 2.5YR4/7
R	65+						

		Sand Fraction %								
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 10	0	1	5	5	4	3	18	49	33
Aeg	10- 20	0						5	57	37
Btg	20- 41	0						6	50	44
IIBg	41- 55	0	0	1	2	4	5	12	61	26
IICkg	55- 65	0	1	1	1	3	6	13	71	16
R	65+									

Horizon	Depth cm	Bulk Density g/cm3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 10	1.45	6.9	3.2	16.7			
Aeg	10- 20		5.0	1.1	11.9			
Btg	20- 41	1.58	4.8	0.8	15.0			
IIBg	41- 55	1.73	6.5	0.4	12.1			
IICkg	55- 65	1.81	7.3			6.0	2.6	0.3

NIAGARA SOIL (NGR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine heavy clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	19	18	1	14	5	46	40	SICL	3.8	6.1	0.2
Btgj1	15	42	0	4	0	35	61	HC	1.2	6.3	0.4
Btgj2	6	57	0	3	0	33	64	HC	0.8	6.7	0.3
Ckgj	16		0	2	0	36	62	HC		7.7	11.8

GENERALIZED PROFILE DESCRIPTIONS AND ANALYSES

NGR ONTARIO 1985 PROFILE NO. LWSP008

LOCATION City of Niagara Falls, Lot 1, Con. III, NTS Map Area 30L/14h, 17 TPT 5830 5970

ELEVATION 178 metres

SITE Winter wheat field

LANDFORM AND PARENT MATERIALS Nearly level lacustrine clay plain. Sediments are composed of reddish coloured heavy clay, sometimes overlain by thin veneer of clay loam

SLOPE 1.5% complex

SOIL WATER REGIME Imperfectly drained, conductivity low, saturation period medium to long

STONINESS Nonstony

CLASSIFICATION Gleyed Gray Brown Luvisol, very fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Taxadjunct to Gleyed Brunisolic Gray Brown Luvisol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-15 (12-19)	10YR3/3m	SIC	weak to moderate, very coarse, columnar	very weak, medium to coarse, subangular blocky	sticky, very plastic	
Btgj	15-31 (14-18)	7.5YR4/4m	HC	weak, very coarse, prismatic	massive	slightly sticky, very plastic	many, fine, distinct, 7.5YR4/6
Ckgj1	31-50 (18-27)	5YR4/3m	HC	weak to moderate, very coarse, prismatic	weak, very coarse, subangular blocky	slightly sticky, very plastic	common, fine, distinct, 7.5YR4/4
Ckgj2	50+	5YR3/3m	HC	very weak, very coarse, prismatic	weak, very coarse, subangular blocky	slightly sticky, very plastic	few, fine, prominent, 7.5YR4/6

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 15	0	2	3	3	4	3	15	43	42
Btgj	15- 31	0						4	33	64
Ckgj1	31- 50	0						1	35	64
Ckgj2	50+	0						1	36	63

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 15	1.27	5.3	4.4	15.3			
Btgj	15- 31	1.48	6.5	1.2	23.1			
Ckgj1	31- 50	1.47	7.7			11.0	2.8	0.2
Ckgj2	50+	1.47	7.7			11.0	2.8	0.2

NIAGARA SOIL - LOAMY PHASE (NGR.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued lacustrine heavy clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	12	17	1	17	5	53	30	SICL	4.4	6.6	0.5
Bmgj	3	24	0	20	9	55	25	SIL	2.2	6.6	0.0
IIBtgj	10	42	0	9	3	39	52	C	0.9	6.7	0.4
IICkgj	11		0	3	0	37	60	HC	0.1	7.6	10.6

NGR.L ONTARIO 1986 PROFILE NO.EWPSP001

LOCATION City of Welland, Lot 16, Con. VI, NTS Map Area 30L/14g, 17 TPT 4642 5936

ELEVATION 180 metres

SITE Abandoned farmland

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping lacustrine clay plain. Clay and heavy clay textures predominate

SLOPE 1% complex

SOIL WATER REGIME Imperfectly drained, conductivity low, saturation period medium

STONINESS Nonstony

CLASSIFICATION Gleyed Gray Brown Luvisol, fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Taxadjunct to Gleyed Brunisolic Gray Brown Luvisol. Higher clay contents than normal in B and C horizons

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-17 (14-20)	10YR3/2m	SICL	moderate, medium, granular	moderate, fine, granular	slightly sticky, friable, very plastic	
IIBtgj	17-39 (37-39)	7.5YR5/4m	HC	strong, medium, columnar	moderate, medium, columnar and angular blocky	very sticky, very firm, very plastic	many, fine, prominent, 7.5YR5/8
IIBt	39-53 (50-54)	5YR5/3m	C	strong, coarse, columnar	moderate, medium, columnar	very sticky, very firm, very plastic	
IICk	53+	5YR4/2m	C	strong, medium, columnar	moderate to strong, medium, angular blocky	very sticky, very firm, very plastic	

		Sand Fraction %										
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm^3	Porosity %
Ap	0- 17	0						10	57	33	11.5	0.95	63
IIBtgj	17- 39	0						4	36	60	23.1	1.28	50
IIBt	39- 53	0						6	38	56	20.1	1.45	45
IICk	53+	0						5	39	56	15.4	1.45	45

		% Moisture Retention (g/g)											
Horizon	Depth cm	0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 17	59.0	37.2	31.4	25.8	5.6	31.56	0.31	7.5	7.0	5.9	24.6	1.1	
IIBtgj	17- 39	35.4	26.2	23.5	20.2	3.3	4.08	0.13	7.1	6.8	1.1	21.9		
IIBt	39- 53	27.8	25.9	23.9	19.6	4.3	3.14	0.20	7.4	6.9	0.8	20.3		
IICk	53+	31.4	26.7	24.3	19.3	5.0	2.20	0.30	8.1	7.6			10.3	1.65

ONEIDA

ONEIDA SOIL (OID)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly clay loam till

DRAINAGE Moderately well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	21	4	20	8	50	30	CL	2.4	6.7	0.7
Bmj	4	52	2	18	7	49	33	SICL	0.8	6.4	0.6
Btj	10	56	3	17	6	48	35	SICL	1.0	6.6	0.5
Ck	8		3	13	4	51	36	SICL		7.5	6.9

ONEIDA SOIL - COARSE RED PHASE (OID.CR)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm sandy textures over reddish-hued clay loam till

DRAINAGE Moderately well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	18	2	62	14	26	12	FSL	1.2	7.1	0.5
IIBt	1	35	1	37	11	34	29	CL	0.6	7.2	0.2
IICk	1		5	24	8	46	30	CL		7.7	8.6

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps

ONEIDA SOIL - LOAMY PHASE (OID.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over clay loam till

DRAINAGE Moderately well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	19	7	32	12	48	20	L	2.5	6.6	0.2
IIBt	6	58	2	18	7	46	36	SICL	0.8	6.2	0.2
IICk	4		4	17	6	50	33	SICL		7.5	5.9

ONEIDA SOIL - LOAMY RED PHASE (OID.LR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued clay loam till

DRAINAGE Moderately well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	2	12	6	40	8	43	17	L	4.1	5.6	0.0
Bm	1	36	8	39	10	41	20	L	0.7	5.2	0.0
IIBt	2	62	8	19	5	39	42	SIC	0.7	6.3	0.6
IICk	2		5	23	7	46	31	CL	0.1	7.7	16.1

ONEIDA SOIL - RED WASHED PHASE (OID.RW)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Washed reddish-hued clay loam till, modified by lacustrine processes

DRAINAGE Moderately well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	22	3	40	17	39	21	L	3.9	6.4	0.7
Bm1	5	39	7	39	17	41	20	L	1.4	5.7	0.9
Bm2	2	64	3	38	19	41	21	L	0.2	5.8	0.0
Bt	5	75	5	29	10	41	30	CL	0.9	6.1	0.7
Ck	4		11	36	15	41	23	L		7.4	11.4

ONEIDA SOIL - WASHED PHASE (OID.W)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Washed clay loam till, modified by lacustrine processes

DRAINAGE Moderately well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	10	22	6	35	12	47	18	L	2.8	6.1	0.4
Bm	6	55	12	37	11	42	21	L	1.1	6.1	1.3
Bt	12	65	6	29	8	41	30	CL	1.1	6.1	0.6
Ck	8		6	27	7	46	27	L	0.2	7.5	10.9

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

OID.W ONTARIO 1985 PROFILE NO.EAWP014

LOCATION Town of Lincoln, Lot 10, Con. VII, NTS Map Area 30M/3e, 17 TPT 2655 7605

ELEVATION 189 metres

SITE Cultivated corn field

LANDFORM AND PARENT MATERIALS Very gently to gently sloping washed clay till plain. Clay loam textures predominate but loam and gravelly loam textures also occur.

SLOPE 5% complex

SOIL WATER REGIME Moderately well drained, conductivity high, saturation period short

STONINESS Nonstony

CLASSIFICATION Orthic Melanic Brunisol, sandy skeletal, alkaline, strongly calcareous, mild humid to subhumid

STATUS Taxadjunct to Brunisolic Gray Brown Luvisol. Also variant because of high gravel contents and great depth of solum

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-20 (20-20)	10YR3/3m	GL	moderate to strong, coarse, granular	moderate to strong, coarse, granular	slightly sticky, nonplastic	
Bm1	20-40 (16-50)	10YR5/5m	GL	moderate to strong, coarse , granular	moderate to strong, coarse, granular	slightly sticky, nonplastic	
Bm2	40-100 (23-60)	7.5YR4/4m	VGCSL	strong, coarse, granular	strong, coarse, granular	slightly sticky, nonplastic	
Bm3	100-150	10YR4/4m	GCSL	moderate, coarse, granular	moderate, coarse, granular	nonsticky, nonplastic	
IIBg	150-165	10YR5/2m	SIC			sticky, very firm, very plastic	few, fine, prominent, 10YR5/6
IICkg	165+	10YR5/2m	SIC			sticky, very firm, very plastic	

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 20	36	15	8	6	5	10	44	41	14
Bm1	20- 40	41	11	10	9	5	9	44	44	12
Bm2	40-100	54	41	14	7	4	5	71	17	11
Bm3	100-150	42	36	17	10	4	7	75	18	7
IIBg	150-165	0						3	42	55
IICkg	165+	0						1	52	47

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 20		6.1	4.7	13.6			
Bm1	20- 40		6.2	0.8	8.7			
Bm2	40-100		5.5	0.3	10.0			
Bm3	100-150		6.5	0.3	9.9			
IIBg	150-165		7.1	0.7	19.5	1.0		
IICkg	165+		7.6			27.0	11.0	0.2

ONTARIO

ONTARIO SOIL (OTI)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine heavy clay

DRAINAGE Moderately well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	15	0	11	4	45	44	SIC	3.8	6.2	1.0
Bm	3	37	0	6	0	33	61	HC	1.5	6.1	2.1
Bt	3	42	0	4	0	32	64	HC	1.7	6.5	0.4
Ck	4		0	2	0	28	70	HC	0.7	7.7	15.7

ONTARIO SOIL - LOAMY PHASE (OTI.L)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued lacustrine heavy clay

DRAINAGE Moderately well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	2	17	0	16	10	58	26	SIL	3.4	6.5	0.0
IIBt	4	48	0	5	0	38	57	HC	0.8	6.1	0.0
IICk	3		0	3	0	32	65	HC		7.5	11.0

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps.

PEEL SOIL (PEL)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm lacustrine silty clay over clay loam till

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	21	0	18	9	53	29	SICL	4.2	6.5	0.1
Btgj	4	51	0	9	4	49	42	SIC	0.8	6.8	0.5
IIBtgj	1	64	0	15	11	48	37	SICL	0.8	7.2	0.4
IICkgj	3		2	9	2	47	44	SIC		7.6	14.5

PEEL SOIL - LOAMY PHASE (PEL.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over PEL soils

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	Nc. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	20	2	21	9	52	27	SIL	4.8	6.3	0.3
Bmgj	3	34	0	22	11	46	32	CL	0.9	5.9	0.0
IIBtgj	4	59	0	11	4	47	42	SIC	0.5	6.2	1.0
IIICkg	3		3	9	2	53	38	SICL		7.6	15.2

PEEL SOIL - LOAMY RED PHASE (PEL.LR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued PEL soils

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	2	18	1	26	8	47	27	L	3.6	6.9	
IIAegj	1	37	0	71	7	19	10	SL	0.7	7.0	0.9
IIBtgj	1	38	0	11	5	37	52	C	1.2	6.3	
IIICkgj	1		20	9	0	41	50	GSIC		7.6	9.1

PEEL SOIL - RED PHASE (PEL.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued lacustrine silty clay over clay loam till

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	2	10	2	14	4	42	44	SIC	3.7	6.9	0.8
Bmgj	1	30	2	18	7	35	47	C	1.7	5.9	0.0
Btgj	1	48	0	4	0	27	69	HC	1.0	7.1	0.3
IICkg	2		2	18	5	38	44	C		7.7	13.0

PEEL SOIL - WASHED PHASE (PEL.W)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm lacustrine silty clay over washed clay loam till

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	20	0	17	7	59	24	SIL	3.8	5.3	
Btgj	1	30	0	17	8	48	35	SICL	1.2	5.3	
IIBtgj1	1	45	1	23	9	42	35	CL	0.8	5.9	
IIBtgj2	1	65	1	20	9	42	38	CL	0.5	5.9	
IIICkgj	1		2	14	4	61	25	SIL		7.6	12.0

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps

PLAINFIELD SOIL (PFD)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mostly eolian fine sand at least 1 m thick

DRAINAGE Rapid

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	2	15	1	86	22	9	5	FS	5.0	6.7	1.0
Bm1	3	42	0	94	10	5	1	FS	0.7	6.0	1.3
Bm2	2	85	0	93	14	6	1	FS	0.4	5.7	0.0
Bm3	2	108	0	93	16	6	1	FS	0.5	5.6	
Ck	3		0	99	9	1	0	FS		7.3	13.0

PLAINFIELD SOIL - DUNE PHASE (PFD.D)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Eolian fine sand formed into dunes

DRAINAGE Rapid

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ah	1	14	0	93	20	4	3	FS	16.2	3.8	
Bm1	1	26	0	98	1	1	1	FS	5.1	4.3	
Bm2	1	41	0	98	0	1	1	FS	0.8	4.5	
Bm3	1	67	0	98	1	1	1	S	0.2	4.9	
Bm4	1	105	0	99	0	1	0	FS	0.1	5.3	
Ck	1		0	98	1	1	1	FS		7.0	10.0

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

PFD.D ONTARIO 1985 PROFILE NO.MEFSP001

LOCATION	Town of Fort Erie, Lot 35, Con. B.F, NTS Map Area 30L/14a, 17 TPT 5480 4610
ELEVATION	177 metres
SITE	Woodland
LANDFORM AND PARENT MATERIALS	Nearly level eolian sand plain containing numerous, strongly sloping eolian sand dunes. Fine sand textures predominate
SLOPE	16% complex
SOIL WATER REGIME	Rapidly to well drained, conductivity high, saturation period very short
STONINESS	Nonstony
CLASSIFICATION	Orthic Melanic Brunisol, sandy, neutral, strongly calcareous, mild humid to subhumid
STATUS	Taxadjunct to Brunisolic Gray Brown Luvisol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ah	0-14 (10-15)	10YR3/1m	FS	moderate, fine, granular	weak to moderate, fine, granular	nonsticky, very friable, nonplastic	
Bm1	14-26 (10-15)	10YR4/6m	FS	massive	single grain	nonsticky, very friable, nonplastic	
Bm2	26-41 (14-18)	10YR5/6m	FS	single grain		nonsticky, loose, nonplastic	
Bm3	41-67 (25-28)	10YR5/5m	S	single grain		nonsticky, loose, nonplastic	
Bm4	67-105 (34-41)	10YR5/4m	FS	single grain		nonsticky, loose, nonplastic	
Ck	105+	10YR6/3m	FS	massive	single grain	nonsticky, loose, nonplastic	

			Sand Fraction %										
Horizon	Depth cm	Grav. >2 mm	VCS >2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm^3	Porosity %
Ah	0- 14	0	0	2	22	49	20	93	4	3	2	0.92	64
Bm1	14- 26	0	0	1	22	74	1	98	1	1	1		
Bm2	26- 41	0	0	3	38	57	0	98	1	1	0	1.27	52
Bm3	41- 67	0	0	6	44	47	1	98	1	1	1	1.33	50
Bm4	67-105	0	0	4	39	56	0	99	1	0	1	1.26	53
Ck	105+	0	0	2	25	70	1	98	2	1	1	1.30	51

		% Moisture Retention (g/g)											
Horizon	Depth cm	0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ah	0- 14	71.7	32.7	23.3	6.7	16.6			4.1	3.8	16.2	36.8		
Bm1	14- 26								4.8	4.3	5.1	12.5		
Bm2	26- 41								5.4	4.5	0.8	9.3		
Bm3	41- 67	48.0	10.0	4.5	0.9	3.6			5.8	4.9	0.2	8.3		
Bm4	67-105	45.3	9.7	4.0	0.6	3.4			6.4	5.3	0.1	8.9		
Ck	105+	38.3	10.3	3.0	0.3	2.7		0.1	8.2	7.0			10.0	0.9

PORT COLBORNE (PCE)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Organic soil, fen-associated, greater than 160 cm deep

DRAINAGE Very poor

USUAL CLASSIFICATION Fibric Mesisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Peat Material and Texture	Stage of Decomposition	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Of1	1	23						woody fen peat	fibric	91.8		
Of2	1	41						woody fen peat	fibric	89.0	3.4	
Of3	1	68						woody fen peat	fibric	89.7	4.0	
Om1	1	97						woody fen peat	mesic	87.0	4.8	
Om2	1	125						sedge fen peat	mesic	85.6	4.7	
Om3	1	200						woody sedge fen peat	mesic	45.2	5.0	
Of4	1	224						woody fen peat	fibric	55.8	4.9	
IIBg	1		0	9	0	59	32	SICL		2.1	5.8	

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

PCE ONTARIO 1985 PROFILE NO. LWS22

LOCATION Township of Wainfleet, Lot 3, Con. III, NTS Map Area 30L/14f, 17 TPT 3905 5320

ELEVATION 177 metres

SITE Wainfleet Marsh; mainly alder or woody shrubs with some birch and poplar

LANDFORM AND PARENT MATERIALS Horizontal fen with organic sediments consisting of woody fen peat with a layer of sedge fen peat. Loamy mineral sediment occurs at 224 cm depth

SLOPE 0.5 % simple

SOIL WATER REGIME Very poorly drained, conductivity high, saturation period prolonged

STONINESS Nonstony

CLASSIFICATION Fibric Mesisol, sphagnic, euic, mild, humid

STATUS Undecided

MORPHOLOGICAL DESCRIPTION, CHEMICAL AND PHYSICAL ANALYSES

Horizon	Depth cm	Colour (moist)	Peat Material and Texture	Stage of Decomposition	von Post Scale	Woody Material Volume %	Organic Matter %	pH $CaCl_2$	$CaCO_3$ %
Of1	0-23	5YR3/3	woody fen peat	fibric	3	10-20	91.8		
Of2	23-41	5YR3/2	woody fen peat	fibric	3	10-20	89.0	3.4	
Of3	41-68	5YR2.5/1	woody fen peat	fibric	3	<10	89.7	4.0	
Om1	68-97	5YR2.5/1	woody fen peat	mesic	5	<10	87.0	4.8	
Om2	97-125	10YR2/1	sedge fen peat	mesic	5	<10	85.6	4.7	
Om3	125-200	10YR2/1	woody sedge fen peat	mesic	5	<10	45.2	5.0	
Of4	200-224	10YR2/1	woody fen peat	fibric	3	<10	55.8	4.9	
IIBg	224+	5Y4/1	SICL				2.1	5.8	

PORTSMOUTH (PUH)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Organic soil, swamp-associated, greater than 160 cm deep

DRAINAGE Very poor

USUAL CLASSIFICATION Typic Mesisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Peat Material and Texture	Stage of Decomposition	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Om1	3	28						woody forest peat	mesic	69.0	5.0	
Om2	3	77						woody forest peat	mesic	81.6	4.8	
Om3	3	110						woody forest peat	mesic	62.1	4.9	
Om4	3	146						woody sedge fen peat	mesic	74.5	5.4	
Om5	2							woody sedge fen peat	mesic	68.0	4.7	

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

PUH ONTARIO 1985 PROFILE NO. LWS24

LOCATION City of Port Colborne, Lot 16, Con. III, NTS Map Area 30L/14g, 17 TPT 4868 5229

ELEVATION 180 metres

SITE Humberstone Marsh; treed wetland

LANDFORM AND PARENT MATERIALS Basin swamp with organic sediments consisting of woody forest peat underlain by sedge fen peat and woody fen peat. Clayey mineral sediment occurs at 184 cm depth

SLOPE 0.5 % simple

SOIL WATER REGIME Very poorly drained, conductivity high, saturation period prolonged

STONINESS Nonstony

CLASSIFICATION Typic Mesisol, mesic, euic, mild, peraquic

STATUS Undecided

MORPHOLOGICAL DESCRIPTION, CHEMICAL AND PHYSICAL ANALYSES

Horizon	Depth cm	Colour (moist)	Peat Material and Texture	Stage of Decomposition	von Post Scale	Woody Material Volume %	Organic Matter %	pH $CaCl_2$	$CaCO_3$ %
Om1	0-22	10YR2/1	woody forest peat	mesic	5	<10	80.7	3.8	
Om2	22-58	10YR2/1	woody forest peat	mesic	5	<10	90.1	3.7	
Om3	58-82	5YR2.5/1	sedge fen peat	mesic	5	<10	89.5	3.9	
Om4	82-90	10YR3/4	woody sedge fen peat	mesic	5	<10	88.3	4.1	
Oh	90-110	10YR2/1	sedge fen peat	humic	7	<10	79.6	4.8	
Om5	110-152	10YR2/2	woody fen peat	mesic	5	<10	69.5	3.7	
Om6	152-184	10YR3/2	sedge fen peat	mesic	5	<10	55.2	3.9	
IIBg1	184-190	2.5YR4/2					28.4	2.8	
IIBg2	190+	5Y4/1	SIC				5.8	6.9	

QUARRY SOIL (QRY)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Organic soil, swamp-associated, 40 to 160 cm deep over clayey mineral soil materials

DRAINAGE Very poor

USUAL CLASSIFICATION Terric Mesisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Peat Material and Texture	Stage of Decomposition	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Om1	4	43						woody forest peat	mesic	74.0	5.6	
Om2	4	69						woody forest peat	mesic	68.7	5.6	
Om3	2	85						woody forest peat	mesic	71.7	5.3	
IIBg	2	112	0	6	0	46	48	SIC		1.9	6.1	
IICkg	2		0	19	7	53	28	SICL		0.3	7.5	11.9

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

QRY ONTARIO 1985 PROFILE NO. LWS14

LOCATION City of Port Colborne, Lot 22, Con. I, NTS Map Area 30L/14g, 17 TPT 4505 4915

ELEVATION 177 metres

SITE Cultivated onion field

LANDFORM AND PARENT MATERIALS Basin swamp with organic sediments consisting of woody forest peat. Clayey mineral sediment occurs at 90 cm depth

SLOPE 0.5 % simple

SOIL WATER REGIME Very poorly drained, conductivity high, saturation period prolonged

STONINESS Nonstony

CLASSIFICATION Terric Mesisol, mesic, euic, mild, peraquic, clayey

STATUS Undecided

MORPHOLOGICAL DESCRIPTION, CHEMICAL AND PHYSICAL ANALYSES

Horizon	Depth cm	Colour (moist)	Peat Material and Texture	Stage of Decomposition	von post Scale	Woody Material Volume %	Organic Matter %	pH $CaCl_2$	$CaCO_3$ %
Om1	0-58	10YR2/1	woody forest peat	mesic	5	<10	60.3	5.2	
Om2	58-76	10YR2/2	woody forest peat	mesic	5	10-20	71.8	5.4	
Om3	76-90	10YR2/1	woody forest peat	mesic	5	<10	59.9	5.4	
IIBg	90+	5Y5/1					2.1	6.7	

RIDGEVILLE SOIL (RVE)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued coarse sandy loam and gravelly sand

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Melanic Brunisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	8	22	8	60	17	29	11	FSL	2.9	5.9	
Bmgj1	13	62	14	77	17	17	6	LCS	0.5	6.2	
Bmgj2	5	83	21	83	13	12	5	GLCS	0.2	6.0	
Ckg	2		16	59	12	34	7	CSL		7.3	6.5

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

RVE ONTARIO 1985 PROFILE NO.MEFP003

LOCATION Town of Pelham, Lot 1, Con. V, NTS Map Area 30M/3c, 17 TPT 3930 6945

ELEVATION 189 metres

SITE Cultivated corn field

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping kame moraine deposits consisting mainly of reddish sandy and gravelly soil materials

SLOPE 2% complex

SOIL WATER REGIME Imperfectly drained, conductivity high, saturation period short

STONINESS Nonstony

CLASSIFICATION Gleyed Melanic Brunisol, sandy, mild humid to subhumid

STATUS Modal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-22 (19-22)	10YR3/2m	CSL	moderate, medium, granular	weak, medium, granular	slightly sticky, very friable, slightly plastic	
Bmgj1	22-42 (20-26)	10YR5/4m	CSL	single grain		nonsticky, very friable, nonplastic	common, fine, distinct, 10YR5/6
Bmgj2	42-70 (25-30)	7.5YR5/4m	GLCS	single grain		nonsticky, loose, nonplastic	common, fine, distinct, 7.5YR5/6
Bmgj3	70-100 (28-34)	7.5YR4/4m	GLCS	single grain		nonsticky, loose, nonplastic	common, fine, distinct, 7.5YR4/6
Bm	100+	7.5YR4/3m	GCS	single grain		nonsticky, loose, nonplastic	

Horizon	Depth cm	Sand Fraction % Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 22	16	10	15	18	4	19	65	26	9
Bmgj1	22- 42	17	15	18	17	10	10	70	24	6
Bmgj2	42- 70	28	10	31	22	9	8	80	14	6
Bmgj3	70-100	32	37	30	11	4	4	86	9	5
Bm	100+	32	25	41	16	2	5	88	8	4

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 22	1.17	6.9	3.0	14.9			
Bmgj1	22- 42	1.30	6.8	0.2	10.5			
Bmgj2	42- 70	1.30	6.6	0.2	11.0			
Bmgj3	70-100	1.31	6.5	0.1	10.8			
Bm	100+	1.27	6.0	0.1	7.3			

SHERKSTON

SHERKSTON SOIL (SRK)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Organic soil, fen-associated, greater than 160 cm deep

DRAINAGE Very poor

USUAL CLASSIFICATION Typic Fibrisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Peat Material and Texture	Stage of Decomposition	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Om1	1	55						woody fen peat	mesic	79.1	5.7	
Of1	1	88						sedge fen peat	fibric	92.1	5.4	
Of2	1	172						woody sedge fen peat	fibric	67.0	5.5	
Om2	1	192						sedge fen peat	mesic	35.9	5.4	
Om3	1	254						sedge fen peat	mesic	69.1	5.7	
Om4	1	384						woody forest peat	mesic	66.6	5.8	
IICg	1		2	19	4	41	40	SIC		1.4	7.0	1.7

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

SRK ONTARIO 1985 PROFILE NO. LWS15

LOCATION City of Port Colborne, Lot 8, Con. I, NTS Map Area 30L/14g, 17 TPT 5097 4860

ELEVATION 177 metres

SITE Treed wetland

LANDFORM AND PARENT MATERIALS Horizontal fen with organic sediments consisting of woody fen peat and sedge fen peat underlain by woody forest peat. Clayey mineral sediment occurs at 384 cm

SLOPE 0.5 % simple

SOIL WATER REGIME Very poorly drained, conductivity high, saturation period prolonged

STONINESS Nonstony

CLASSIFICATION Typic Fibrisol, mesic, euic, mild, peraquic

STATUS Undecided

MORPHOLOGICAL DESCRIPTION, CHEMICAL AND PHYSICAL ANALYSES

Horizon	Depth cm	Colour (moist)	Peat Material and Texture	Stage of Decomposition	von Post Scale	Woody Material Volume %	Organic Matter %	pH $CaCl_2$	$CaCO_3$ %
Om1	0-55	10YR2/1	woody fen peat	mesic	5	10-20	79.1	5.7	
Of1	55-88	10YR3/4	sedge fen peat	fibric	3	<10	92.1	5.4	
Of2	88-172	10YR2/2	woody sedge fen peat	fibric	3	<10	67.0	5.5	
Om2	172-192	10YR3/2	sedge fen peat	mesic	5	<10	35.9	5.4	
Om3	192-254	10YR2/2	sedge fen peat	mesic	5	<10	69.1	5.7	
Om4	254-384	10YR2/1	woody forest peat	mesic	5	10-20	66.6	5.8	
IICkg	384+	10YR4/1	SICL				1.4	7.0	1.7

SILVER HILL SOIL - RED PHASE (SIH.R)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over reddish-hued lacustrine silt loam

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	23	1	65	23	19	16	FSL	3.2	5.8	0.0
Bg1	1	50	5	79	26	12	9	LFS	0.4	6.2	0.4
Bg2	1	75	4	77	20	13	10	FSL	0.2	6.9	0.0
IIBC	1	82	11	34	12	41	25	L		7.3	0.5
IICkg	1		7	34	10	41	25	L		7.6	8.7

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps

SMITHVILLE

SMITHVILLE SOIL (SHV)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine heavy clay

DRAINAGE Moderately well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	17	14	0	11	3	45	44	SIC	3.8	6.3	0.2
Bt	15	33	0	5	1	34	61	HC	1.6	6.3	0.2
Ck	15		0	3	0	34	63	HC	0.1	7.5	13.2

SMITHVILLE SOIL - LOAMY PHASE (SHV.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over lacustrine heavy clay

DRAINAGE Moderately well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	5	20	1	18	8	49	33	SICL	3.6	5.9	0.7
IIBt	5	47	0	6	2	31	63	HC	0.9	5.9	1.8
IICk	5	100	0	3	0	36	61	HC	0.3	7.5	16.6

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

SHV.L ONTARIO 1985 PROFILE NO.MEFP002

LOCATION	Township of West Lincoln, Lot 30, Con. V, NTS Map Area 30M/4a, 17 TPT 1910 6830
ELEVATION	192 metres
SITE	Hay - pasture field
LANDFORM AND PARENT MATERIALS	Very gently sloping area on glaciolacustrine plain, sediments are composed of silty clay, clay and heavy clay, sometimes overlain by thin veneer of clay loam
SLOPE	5% complex
SOIL WATER REGIME	Moderately well drained, conductivity medium, saturation period short
STONINESS	Nonstony
CLASSIFICATION	Orthic Gray Brown Luvisol, fine clayey, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Taxadjunct to Brunisolic Gray Brown Luvisol. Clay contents in B and C horizons somewhat lower than normal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-20 (17-21)	10YR4/3m	CL	weak, coarse, granular	weak to moderate, coarse, granular	slightly sticky, firm, very plastic	
IIBt	20-33 (12-16)	10YR4/3m	C	massive	very weak, coarse, subangular blocky	sticky, very firm, very plastic	
IIBC	33-44 (9-13)	10YR4/2m	HC	very weak, coarse, angular blocky	weak, coarse, subangular blocky	sticky, firm, very plastic	
IICk	44+	10YR4/2m	SIC	weak, coarse, angular blocky	weak to moderate, coarse, angular blocky	very sticky, very firm, very plastic	

		Sand Fraction %								
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 20	0	1	2	2	5	12	22	49	28
IIBt	20- 33	0						5	35	59
IIBC	33- 44	0						3	35	62
IICk	44+	1						5	45	51

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 20	1.28	5.5	3.0	15.2			
IIBt	20- 33	1.56	5.6	1.1	26.6			
IIBC	33- 44	1.45	7.1	0.8	28.8	1.0		
IICk	44+	1.57	7.6		34.9	16.0	4.3	0.2

TAVISTOCK SOIL (TVK)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over lacustrine silty clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	31	22	1	50	29	35	15	L	3.7	6 3	0.2
Bmgj	24	43	0	53	33	32	15	VFSL	1.1	6.2	0.0
Btgj	17	54	0	43	28	36	21	L	0.6	6.3	0.6
IIBtgj	12	64	0	21	12	44	35	CL	0.6	6.4	0.3
IICkgj	25		0	7	2	49	44	SIC		7.5	16.7

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

(1)TVK ONTARIO 1985 PROFILE NO.LWSSP012

LOCATION City of Niagara Falls, Lot 28, NTS Map Area 30M/3g, 17 TPT 5125 7706

ELEVATION 183 metres

SITE Hay field

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping lacustrine plain with 40 to 100 cm of loamy soil over dominantly clayey sediments

SLOPE 3% complex

SOIL WATER REGIME Imperfectly drained, conductivity medium to low, saturation period medium to long

STONINESS Nonstony

CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol, loamy/fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Modal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-24 (18-28)	10YR3/3m	SIL	very weak, medium to coarse, subangular blocky	weak, fine to medium, subangular blocky	slightly sticky, friable, slightly plastic	
Bmgj	24-40 (12-21)	10YR5/4m	SIL	very weak, very coarse, subangular blocky	weak, fine to medium, subangular blocky	slightly sticky, very friable, slightly plastic	common, fine, distinct, 7.5YR4/6
Btgj1	40-54 (9-18)	10YR4/3m	SIL	moderate to strong, medium to coarse, subangular blocky	moderate to strong, medium, subangular blocky	sticky, firm, very plastic	many, medium, prominent, 10YR4/6
Btgj2	54-65 (7-14)	10YR4/4m	SIL	moderate, coarse, platy	moderate, coarse, platy	sticky, very plastic	many, medium, distinct, 10YR4/6
IIBg	65-70 (4-8)	10YR4/1m	SIC	strong, coarse, subangular blocky	strong, medium to coarse, subangular blocky	slightly sticky, very plastic	many, medium, prominent, 10YR5/6
IICkg	70+	10YR4/2m	SIC	strong, coarse, angular blocky	strong, medium to coarse, angular blocky	slightly sticky, very plastic	common, fine, prominent, 10YR4/6

			Sand Fraction %										
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm^3	Porosity %
Ap	0- 24	0	1	1	3	8	17	30	56	13	5	1.23	52
Bmgj	24- 40	0	1	1	3	9	17	30	58	12	4	1.27	52
Btgj	40- 54	0	0	1	2	4	11	17	57	26	13	1.46	46
Bmgj	54- 65	0	0	1	2	4	16	23	58	20	9	1.40	48
IIBg	65- 70	0						10	49	41	10		
IICkg	70+	0						4	48	48	9	1.47	46

		% Moisture Retention (g/g)											
Horizon	Depth cm	0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 24	52.3	39.3	29.7	8.7	21.0	0.18		5.7	5.3	3.1	11.4		
Bmgj	24- 40	51.0	39.7	28.7	7.0	21.7	0.12		5.9	5.3	0.8	9.7		
Btgj	40- 54	52.3	41.0	34.0	19.7	14.3	0.08		6.1	5.4	0.6	17.7		
Bmgj	54- 65	58.3	43.3	28.7	15.3	13.4	0.09		6.8	6.2	0.4	13.5		
IIBg	65- 70								7.5	7.3	0.4	24.9	2.0	
IICkg	70+	57.7	47.7	43.0	26.7	16.3	0.13	0.2	7.8	7.6			17.0	5.4

(2)TVK ONTARIO 1985 PROFILE NO.EWPP003

LOCATION	Town of Pelham, Lot 20, Con. X, NTS Map Area 30M/3d, 17 TPT 3158 6221
ELEVATION	184 metres
SITE	Cultivated corn field
LANDFORM AND PARENT MATERIALS	Nearly level to very gently sloping lacustrine plain with 40 to 100 cm of loamy soil over dominantly clayey sediments
SLOPE	1.5% complex
SOIL WATER REGIME	Imperfectly drained, conductivity medium to low, saturation period medium to long
STONINESS	Nonstony
CLASSIFICATION	Gleyed Brunisolic Gray Brown Luvisol, coarse loamy/fine clayey, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Modal. Bt horizons are somewhat redder in colour than normal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-27 (25-28)	10YR3/3m	L	strong, medium, subangular blocky	strong, fine, subangular blocky	slightly sticky, friable, plastic	
Bmgj	27-47 (12-33)	10YR5/4m	VFSL	moderate, fine to medium, subangular blocky	weak to moderate, fine, subangular blocky	slightly sticky, friable, slightly plastic	many, fine, distinct, 10YR5/6
Btgj	47-54 (0-15)	7.5YR3/4m	VFSL	massive	massive	slightly sticky, firm, plastic	common, fine, distinct, 7.5YR4/6
IIBtgj	54-74 (14-22)	7.5YR4/4m	SIC	strong, coarse, columnar	massive	sticky, firm, very plastic	many, medium, distinct, 7.5YR4/6
IICkgj	74+	10YR4/3m	SIC	massive	massive	sticky, very firm, plastic	common, fine, prominent, 10YR4/6

		Sand Fraction %								
Horizon	Depth cm	Grav. <2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 27	0	1	1	3	15	29	49	38	13
Bmgj	27- 47	0	1	2	4	25	36	68	29	3
Btgj	47- 54	0	0	2	5	28	33	68	12	20
IIBtgj	54- 74	1	1	0	1	3	5	10	48	42
IICkgj	74+	1						5	53	42

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0- 27	1.22	6.7	3.2	11.4			
Bmgj	27- 47	1.57	6.4	0.6	6.8			
Btgj	47- 54	1.68	6.7	0.3	12.0			
IIBtgj	54- 74	1.69	7.4	0.4	21.0	2.0		
IICkgj	74+	1.74	7.6			10.0	1.7	0.2

TAVISTOCK SOIL - HEAVY PHASE (TVK.H)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over lacustrine heavy clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	7	17	1	34	23	43	23	L	4.0	6.4	0.6
Bmgj	7	36	0	43	28	39	18	L	1.2	5.9	
IIBtgj	6	68	0	13	6	29	58	C	0.6	6.1	
IICkg	5		0	5	0	30	65	HC		7.6	14.6

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps

TAVISTOCK SOIL - RED PHASE (TVK.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued loamy textures over lacustrine silty clay

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	14	22	1	52	31	34	14	VFSL	3.1	6.0	0.6
Bmgj	20	45	0	60	39	30	10	VFSL	0.9	6.0	0.3
Btgj	10	59	0	56	36	27	17	VFSL	0.4	6.7	0.5
IIBtgj	6	77	0	20	11	40	40	SICL	0.4	5.2	0.0
IICkgj	10		0	10	4	50	40	SICL	0.1	7.5	12.7

TAVISTOCK SOIL - TILL PHASE (TVK.T)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over clay loam till

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	16	22	4	50	29	34	16	L	3.2	6.4	0.5
Bmgj	14	42	4	52	30	32	16	VFSL	1.1	6.3	0.2
Btgj	9	55	1	42	28	36	22	L	0.5	6.4	0.1
IIBtgj	9	80	2	25	12	43	32	CL	0.5	6.8	1.1
IICkgj	12		4	18	7	46	36	SICL	0.0	7.6	11.9

TAVISTOCK SOIL - TILL RED PHASE (TVK.TR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm reddish-hued loamy textures over clay loam till

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	21	2	53	41	34	13	VFSL	3.4	6.8	1.2
Bmgj	4	49	2	59	46	31	10	VFSL	0.9	6.9	0.2
Btgj	3	67	5	37	27	49	14	SIL	1.0	6.9	0.3

TOLEDO

TOLEDO SOIL (TLD)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine silty clay

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	160	18	0	13	5	49	38	SICL	4.8	6.2	0.3
Bg1	153	43	0	9	3	43	48	SIC	1.3	6.3	0.3
Bg2	47	59	0	10	4	42	48	SIC	1.0	6.6	0.6
Ckg	148		0	5	1	48	47	SIC	0.1	7.6	15.2

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

TLD ONTARIO 1985 PROFILE NO.LWSSP002

LOCATION Township of Wainfleet, Lot 4, Con. V, NTS Map Area 30L/14f, 17 TPT 3883 5730

ELEVATION 177 metres

SITE Ploughed field

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping lacustrine clay plain

SLOPE 1.5% simple

SOIL WATER REGIME Poorly drained, conductivity low, saturation period long

STONINESS Nonstony

CLASSIFICATION Orthic Humic Gleysol, fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Modal. Ap horizon somewhat thicker than normal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-29 (24-35)	10YR3/2m	SIC	very weak, coarse, subangular blocky	very weak, coarse, subangular blocky	sticky, friable, very plastic	
Bg1	29-41 (8-16)	10YR5/1m	SIC	weak to moderate, coarse, columnar	weak, coarse, subangular blocky	sticky, firm, very plastic	many, medium, prominent, 10YR5/8
Bg2	41-55 (11-17)	10YR5/1m	SICL	weak, coarse, columnar	weak, coarse, subangular blocky	sticky, firm, very plastic	many, medium, prominent, 10YR5/8
Ckg	55+	10YR4/2m	SIC	weak, coarse, subangular blocky	weak, coarse, subangular blocky	sticky, firm, very plastic	many, medium, prominent, 10YR5/6

Horizon	Depth cm	Grav. <2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm³	Porosity %
Ap	0-29	0						7	51	42	17	0.90	64
Bg1	29-41	0						9	48	43	19	1.40	47
Bg2	41-55	0	0	0	0	2	9	11	52	38	15	1.57	43
Ckg	55+	0						3	54	43	12	1.52	45

Horizon	Depth cm	% Moisture Retention (g/g) 0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0-29	62.5	46.8	42.2	18.7	23.5	2.30		5.2	5.2	5.7	25.8		
Bg1	29-41	53.0	48.7	44.7	24.7	20.0	0.13		6.4	6.1	0.7	25.8		
Bg2	41-55	47.3	41.3	39.0	25.0	14.0			7.4	6.9	0.5	28.4		
Ckg	55+	45.7	40.3	37.7	26.3	11.4	5.80	0.2	7.9	7.6			16.0	2.3

TOLEDO SOIL - COARSE PHASE (TLD.C)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm sandy textures over lacustrine silty clay

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	2	15	0	55	24	29	16	VFSL	3.1	7.0	0.3
IIBtg	3	48	0	13	6	50	37	SICL	0.4	7.0	0.2
IICkg	2		1	14	8	47	39	SICL		7.7	12.5

TOLEDO SOIL - LOAMY RED PHASE (TLD.LR)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued lacustrine silty clay

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	13	22	1	30	17	46	24	L	3.5	6.2	0.2
IIBg	6	44	1	24	11	37	39	CL	0.7	6.9	0.4
IIBtgj	9	47	0	11	5	47	42	SIC	0.8	6.7	0.2
IICkg	10		1	9	3	50	41	SIC		7.7	14.7

TOLEDO SOIL - PEATY PHASE (TLD.P)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm peaty material over lacustrine silty clay

DRAINAGE Very poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Oh	3	28						ORG	46.0	6.0	
IIBg	3		0	15	9	51	34	SICL	0.6	6.1	

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

TLD.P ONTARIO 1985 PROFILE NO.EAWP004

LOCATION Township of Wainfleet, Lot 9, Con. II, NTS Map Area 30L/14f, 17 TPT 3674 5012

ELEVATION 180 metres

SITE Woodland

LANDFORM AND PARENT MATERIALS Level area on lacustrine plain near edge of Wainfleet Marsh. Dominantly clayey sediments overlain by organic soil layer

SLOPE 0.5% simple

SOIL WATER REGIME Very poorly drained, conductivity high in organic soil, low in clay, saturation period prolonged

STONINESS Nonstony

CLASSIFICATION Orthic Humic Gleysol, fine loamy, alkaline, extremely calcareous, mild humid to subhumid

STATUS Variant, lower organic matter content in surface horizon than typical peaty phase

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ah	0-33 (28-36)	10YR2/1m	CSL	moderate to strong, fine to medium, granular	moderate to strong, fine to medium, granular	very friable	
IIBg1	33-50 (13-20)	10YR5/1m	CL	moderate, medium to coarse, columnar	moderate to strong, coarse, columnar	sticky, very firm, very plastic	many, medium, prominent, 10YR5/6
IIBg2	50-87 (32-40)	10YR5/1m	CL	moderate to strong, coarse, columnar	moderate to strong, coarse, columnar	sticky, very firm, very plastic	many, medium, prominent, 10YR5/8
IICkg	87+	10YR5/2m	SIL	weak to moderate, coarse, columnar	weak to moderate, coarse, columnar	sticky, very firm, very plastic	many, medium, prominent, 7.5YR4/6

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ah	0- 33	0	16	17	10	7	4	54	25	20
IIBg1	33- 50	0	0	0	1	5	15	21	52	27
IIBg2	50- 87	0	1	2	9	6	15	32	34	35
IICkg	87+	0						4	74	22

Horizon	Depth cm	Bulk Density g/cm³	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ah	0- 33	0.64	6.5	18.0	107.5			
IIBg1	33- 50	1.61	6.5	0.7	13.8			
IIBg2	50- 87	1.55	6.1	0.5	16.4			
IICkg	87+	1.54	7.5			18.0	1.5	0.2

TOLEDO SOIL - RED PHASE (TLD.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine silty clay

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	43	18	1	16	6	47	37	SICL	5.4	6.2	1.2
Bg	41	47	0	9	3	44	47	SIC	1.3	6.6	1.1
Ckg	31		0	6	1	48	46	SIC	0.1	7.6	16.3

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

TLD.R ONTARIO 1985 PROFILE NO.LWSSP011

LOCATION City of Niagara Falls, Lot 17, Con. II, NTS Map Area 30M/3a, 17 TPT 5823 6625

ELEVATION 175 metres

SITE Cultivated corn field

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping lacustrine clay plain

SLOPE 1.5% complex

SOIL WATER REGIME Poorly drained, conductivity low, saturation period long

STONINESS Nonstony

CLASSIFICATION Orthic Luvic Gleysol, fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Taxadjunct to Orthic Humic Gleysol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-18 (18-20)	10YR3/2m	SICL	weak, very coarse, subangular blocky	weak, coarse, subangular blocky	slightly sticky, very plastic	
Aeg	18-31 (8-14)	2.5Y4/2m	SIC	weak to moderate, very coarse, columnar	massive	slightly sticky, very plastic	many, fine, prominent, 7.5YR5/8
Btg	31-46 (14-20)	5YR4/2m	SIC	weak to moderate, coarse, columnar	weak to moderate, very coarse, subangular blocky	slightly sticky, firm, very plastic	many, fine, prominent, 7.5YR4/6
Ckg	46+	5YR4/2m	SIC	weak, very coarse, columnar	moderate to strong, coarse, angular blocky	slightly sticky, firm, very plastic	common, medium, prominent, 10YR4/6

		Sand Fraction %											
Horizon	Depth cm	Grav. <2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm^3	Porosity %
Ap	0- 18	0						4	63	33	14	1.18	53
Aeg	18- 31	0						6	50	44	20	1.56	41
Btg	31- 46	0						4	45	51	20	1.59	40
Ckg	46+	0						4	53	43	13	1.58	42

		% Moisture Retention (g/g)											
Horizon	Depth cm	0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 18	59.0	43.3	35.7	16.3	19.4	1.00		6.8	6.8	5.8	21.1		
Aeg	18- 31	53.0	48.0	44.7	27.3	17.4	0.04		6.8	6.6	1.8	20.4		
Btg	31- 46	54.3	49.3	45.7	31.3	14.4	0.13		7.4	7.1	0.6	24.7	1.0	
Ckg	46+	51.0	44.0	40.0	30.0	10.0	0.10	0.2	8.0	7.8			14.0	2.0

TRAFALGAR SOIL (TFG)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS — Mainly reddish-hued silty clay loam at least 1 m thick over Queenston shale bedrock

DRAINAGE — Imperfect

USUAL CLASSIFICATION — Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	17	1	12	2	51	37	SICL	3.0	6.6	0.6
Bmgj	3	45	0	7	0	55	38	SICL	0.6	6.2	0.0
Btgj	2	59	1	5	0	49	46	SIC	0.7	5.4	0.0
Ckgj	3	100	0	10	4	58	32	SICL		7.6	3.7
R	4										

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

TFG ONTARIO 1985 PROFILE NO.EAWP010

LOCATION — Town of Grimsby, Lot 13, Con. I, NTS Map Area 30M/4h, 17 TPT 1562 8412

ELEVATION — 88 metres

SITE — Pear orchard

LANDFORM AND PARENT MATERIALS — Nearly level to very gently sloping shale bedrock plain, overlain by dominantly clayey reddish coloured sediments

SLOPE — 2.5% complex

SOIL WATER REGIME — Imperfectly drained, conductivity medium to high, saturation period short to medium

STONINESS — Nonstony

CLASSIFICATION — Gleyed Gray Brown Luvisol, fine loamy, alkaline, weakly calcareous, mild humid to subhumid

STATUS — Taxadjunct to Gleyed Brunisolic Gray Brown Luvisol. Also lower clay contents than normal in A and C horizons

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-16 (11-21)	5YR4/3m	SIL	strong, coarse, angular blocky	strong, medium to coarse, subangular blocky	slightly sticky, very firm, very plastic	
Btgj	16-48 (28-34)	5YR4/3m	SICL	strong, medium to coarse, columnar	strong, medium to coarse, columnar	sticky, very firm, very plastic	few, fine, distinct,5YR5/3
Ck	48+	2.5YR4/3m	SIL	moderate, medium to coarse, columnar	moderate, medium to coarse, columnar	sticky, very firm, very plastic	

Horizon	Depth cm	Sand Fraction % Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0- 16	2	4	4	3	5	5	21	56	23
Btgj	16- 48	0	0	2	3	3	3	11	52	37
Ck	48+	0	1	2	4	7	6	20	60	20

Horizon	Depth cm	Bulk Density g/cm³	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Del Ratio	Elec. Cond. mmhos/cm
Ap	0- 16	1.24	7.0	3.9	16.9	1.0		
Btgj	16- 48	1.59	5.9	0.6	13.7			
Ck	48+	1.79	7.5			6.0	2.2	0.2

TRAFALGAR SOIL - LOAMY PHASE (TFG.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over TFG soils

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	2	25	1	44	20	39	17	L	2.4	6.7	0.4
IIBtgj	2	47	1	18	5	43	39	SICL	0.8	6.5	0.0
IICkgj	2		0	7	0	64	29	SICL		7.5	6.5

TRAFALGAR SOIL - SHALLOW PHASE (TFG.S)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 50 to 100 cm reddish-hued silty clay loam over Queenston shale bedrock

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	7	16	2	16	3	50	34	SICL	2.7	6.6	0.5
Bmgj	4	39	3	20	4	46	34	SICL	1.4	5.9	0.0
Btgj	3	65	1	9	1	52	39	SICL	0.7	5.8	0.0
Ckgj	6	80	0	11	3	65	24	SIL		7.5	4.5
R	7										

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

TFG.S ONTARIO 1985 PROFILE NO.EAWSP007

LOCATION	Town of Grimsby, Lot 19, Con. I, NTS Map Area 30M/4h, 17 TPT 1258 8480
ELEVATION	91 metres
SITE	Abandoned vineyard
LANDFORM AND PARENT MATERIALS	Nearly level shale bedrock plain, overlain by dominantly clayey reddish coloured sediments
SLOPE	1.5% complex
SOIL WATER REGIME	Imperfectly drained, conductivity medium to high, saturation period medium
STONINESS	Nonstony
CLASSIFICATION	Gleyed Brunisolic Gray Brown Luvisol, coarse loamy, shallow lithic, mild humid to subhumid
STATUS	Variant because of lower clay contents in A and B horizons and non-existent C horizon

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-15 (14-16)	5YR4/3m	SIL	moderate, medium, subangular blocky	moderate, medium, subangular blocky	slightly sticky, very firm, very plastic	
Bmgj	15-34 (16-19)	5YR4/3m	SIL	moderate, medium to coarse, subangular blocky	moderate, medium to coarse, subangular blocky	sticky, very firm, plastic	few, fine, distinct, 5YR4/4
Btgj1	34-45 (10-14)	5YR4/3m	SIL	moderate, coarse, angular blocky	medium, angular blocky	sticky, very firm, plastic	few, fine, distinct, 5YR4/6
Btgj2	45-83 (38-40)	5YR3/3m	SIL	moderate, coarse, columnar	moderate, coarse, columnar	slightly sticky, very firm, very plastic	common, medium, distinct, 5YR4/4
R	83+						

			Sand Fraction %										
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm^3	Porosity %
Ap	0-15	0	2	3	1	2	3	11	69	20	8	1.46	45
Bmgj	15-34	0	8	7	4	4	4	27	56	18	6	1.44	46
Btgj1	34-45	0	3	8	6	5	6	27	50	23	7	1.49	44
Btgj2	45-83	0						6	52	42	7	1.76	36
R	83+												

		% Moisture Retention (g/g)											
Horizon	Depth cm	0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0-15	56.3	43.7	35.3	13.7	21.6	0.04		7.5	6.9	2.4	15.3		
Bmgj	15-34	56.0	40.7	31.7	13.0	18.7	0.10		6.1	5.6	1.6	11.2		
Btgj1	34-45	55.0	42.0	33.3	14.3	19.0	0.06		5.7	5.3	2.2	12.1		
Btgj2	45-83	50.3	42.3	37.7	27.7	10.0	0.21		6.2	5.9	1.0			
R	83+													

TUSCOLA

TUSCOLA SOIL (TUC)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly lacustrine silt loam

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	31	21	0	34	21	48	18	L	3.5	6.4	0.2
Bmgj	27	55	0	33	22	50	17	SIL	0.8	6.4	0.2
Btgj1	24	60	0	28	20	49	23	SIL	0.5	6.3	0.1
Btgj2	5	83	0	22	16	54	24	SIL	0.4	6.0	0.0
Ckgj	17		0	23	13	58	19	SIL		7.6	9.8

TUSCOLA SOIL - RED PHASE (TUC.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine silt loam

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	28	23	1	43	29	42	15	L	2.7	6.1	0.1
Bmgj	31	57	0	42	30	44	14	L	0.7	5.7	0.2
Btgj1	20	61	0	31	22	45	24	L	0.4	6.1	0.0
Btgj2	5	72	1	24	18	52	24	SIL	0.3	6.2	0.0
Ckgj	13		1	27	16	57	16	SIL		7.5	9.5

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

TUC.R ONTARIO 1985 PROFILE NO. EAWSP016

LOCATION	Town of Pelham, Lot 3, Con. X, NTS Map Area 30M/3c, 17 TPT 3879 6389
ELEVATION	186 metres
SITE	Hay - pasture field
LANDFORM AND PARENT MATERIALS	Nearly level to very gently sloping lacustrine plain with local hummocky and dissected areas. Reddish, surficial loamy sediments grade into clayey sediments at depths greater than 1 metre
SLOPE	3% complex
SOIL WATER REGIME	Imperfectly drained, conductivity medium to low, saturation period medium to long
STONINESS	Nonstony
CLASSIFICATION	Gleyed Brunisolic Gray Brown Luvisol, coarse loamy, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Modal. Clay contents are lower than normal and depth to C horizon is deeper than normal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-19 (18-20)	10YR4/3m	VFSL	massive	weak, medium to coarse, subangular blocky	nonsticky, very friable, nonplastic	
Bm	19-41 (19-26)	10YR5/6m	SIL	massive	very weak, medium to coarse, subangular blocky	nonsticky, very friable, nonplastic	
Btgj	41-57 (15-18)	7.5YR4/4m	SIL	massive	very weak, coarse, platy	nonsticky, friable, slightly plastic	few, fine, prominent, 7.5YR5/8
Bmgj1	57-74 (15-18)	7.5YR4/4m	SI	massive	weak, very coarse, subangular blocky	nonsticky, friable, nonplastic	common, medium, distinct, 7.5YR5/6
Bmgj2	74-90 (14-19)	7.5YR5/3m	SIL	massive	massive	slightly sticky, friable, very plastic	common, medium, prominent, 7.5YR5/6
Bmgj3	90+	7.5YR6/3m	SIL	massive	massive	nonsticky, friable, slightly plastic	many, medium, prominent, 7.5YR5/6

		Sand Fraction %											
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm^3	Porosity %
Ap	0- 19	0	1	2	3	8	35	48	44	9	3	0.97	62
Bm	19- 41	0	1	1	1	4	36	43	52	4	1	1.21	53
Btgj	41- 57	0						10	78	12	4	1.45	45
Bmgj1	57- 74	0	0	0	0	0	11	12	81	8	3	1.43	46
Bmgj2	74- 90	0	0	0	0	1	19	20	75	6	3	1.39	50
Bmgj3	90+	0	0	0	0	1	44	46	51	3	2	1.40	47

		% Moisture Retention (g/g)											
Horizon	Depth cm	0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 19	70.7	44.0	31.0	5.7	25.3	7.80		6.1	5.5	3.5	12.0		
Bm	19- 41	54.7	44.3	20.3	4.7	15.6	1.90		6.2	5.4	0.9	4.5		
Btgj	41- 57	49.0	38.3	28.0	9.7	18.3	0.13		5.7	5.2	0.3	8.8		
Bmgj1	57- 74	52.3	43.0	35.7	10.0	25.7	0.03		5.8	4.9	0.1	8.5		
Bmgj2	74- 90	50.7	41.7	35.7	11.3	24.4	0.42		6.0	4.9	0.0	7.4		
Bmgj3	90+	57.0	45.3	24.3	5.3	19.0	0.40		5.8	4.8	0.1	7.1		

VINELAND SOIL (VLD)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine fine sandy loam and very fine sandy loam

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	62	23	1	65	38	25	9	VFSL	2.7	6.1	0.5
Bmgj1	79	53	1	70	39	23	7	VFSL	0.6	6.1	0.2
Bmgj2	30	60	0	75	39	20	6	VFSL	0.3	6.1	0.2
Btgj1	46	74	1	61	41	28	12	VFSL	0.8	6.3	0.1
Btgj2	12	83	0	61	40	28	12	VFSL	0.2	6.3	0.2
Ckgj	21		1	65	37	29	6	VFSL		7.5	8.1

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

VLD ONTARIO 1985 PROFILE NO.LWSSP001

LOCATION Town of Pelham, Lot 15, Con. VIII, NTS Map Area 30M/3c, 17 TPT 3372 6567

ELEVATION 198 metres

SITE Pear orchard

LANDFORM AND PARENT MATERIALS Nearly level to very gently sloping lacustrine sand plain. Reddish surficial sandy sediments grade into clayey sediments at depths greater than 1 metre

SLOPE 3.5% complex

SOIL WATER REGIME Imperfectly drained, conductivity medium to high, saturation period medium

STONINESS Nonstony

CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol, coarse loamy, mild humid to subhumid

STATUS Modal. Silt content of the upper subsurface horizons are higher than normal, and depth to C horizon is greater than normal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-21 (19-23)	10YR3/3m	VFSL	very weak, coarse, subangular blocky	weak to moderate, medium to coarse, subangular blocky	friable, slightly plastic	
Bmgj1	21-36 (13-17)	10YR5/6m	SIL	massive		friable, slightly plastic	common, fine, distinct, 7.5YR5/6
Bmgj2	36-47 (10-15)	10YR5/4m	L	weak to moderate, coarse, subangular blocky	weak to moderate, medium, subangular blocky	friable, slightly plastic	many, medium, distinct, 7.5YR4/6
Btgj	47-57 (7-12)	5YR4/4m	L	weak, coarse, subangular blocky	weak, coarse, subangular blocky	firm, plastic	many, medium, prominent, 7.5YR5/8
Bmgj3	57-84 (23-30)	5YR4/4m	VFSL	massive		friable, slightly plastic	many, medium, prominent, 7.5YR5/8
Bmgj4	84+	7.5YR5/4m	VFSL	massive		friable, slightly plastic	many, coarse, distinct, 7.5YR4/6

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm^3	Porosity %
Ap	0- 21	0	0	1	2	12	39	54	38	8	3	1.28	51
Bmgj1	21- 36	1	1	1	1	8	31	42	52	6	1	1.10	59
Bmgj2	36- 47	1	1	1	1	7	32	42	50	8	2	1.28	52
Btgj	47-57	0	1	1	1	3	34	40	47	13	4	1.40	47
Bmgj3	57- 84	0	0	1	1	1	50	53	37	10	4	1.47	44
Bmgj4	84+	0	0	0	0	1	61	62	33	4	1	1.43	47

Horizon	Depth cm	% Moisture Retention (g/g) 0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 21	49.0	38.0	29.3	6.0	23.3	5.30		6.0	6.2	2.2	13.8		
Bmgj1	21- 36	52.3	41.7	31.0	5.3	25.7	9.50		6.0	5.5	1.0	7.7		
Bmgj2	36- 47	50.7	39.3	26.7	4.0	22.7	0.56		6.0	5.1	0.3	7.9		
Btgj	47-57	54.7	41.3	30.3	9.2	21.1	0.06		5.9	5.4	0.3	9.4		
Bmgj3	57- 84	54.0	41.7	30.0	9.0	21.0	0.07		6.2	5.7	0.3	9.7		
Bmgj4	84+	57.3	45.3	24.7	6.3	18.4	0.18		6.4	5.5	0.1	7.7		

VINELAND SOIL - BROWN PHASE (VLD.B)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly brownish-hued lacustrine fine sandy loam and very fine sandy loam

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	20	23	1	69	35	22	9	VFSL	2.9	6.5	0.3
Bm	7	40	1	78	35	17	5	LFS	1.3	6.1	2.1
Bmgj1	18	57	0	77	41	17	6	LFS	0.8	6.4	0.4
Btgj	15	74	1	68	34	19	13	VFSL	0.4	6.4	0.0
Bmgj2	10	83	0	81	44	12	7	LFS	0.4	6.1	0.1
Ckgj	12		1	63	41	29	8	VFSL		7.6	14.5

VITTORIA

VITTORIA SOIL (VIT)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over lacustrine silt loam

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	9	25	2	70	35	20	10	VFSL	2.9	6.2	0.3
Bmgj	8	53	2	70	33	23	7	VFSL	0.5	6.3	0.1
Btgj	6	67	0	64	34	24	12	VFSL	0.4	6.3	0.0
IICkgj	5		0	17	10	64	19	SIL		7.5	17.8

VITTORIA SOIL - RED PHASE (VIT.R)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over reddish-hued lacustrine silt loam

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	12	26	2	69	28	22	9	VFSL	2.8	6.5	0.8
Bmgj	10	45	3	72	29	20	8	FSL	0.7	6.5	0.1
Btgj	9	60	3	63	20	23	14	FSL	0.3	6.6	0.2
IIBtgj	7	80	1	46	30	39	15	L	0.7	6.6	0.1
IICkg	7		1	34	22	56	10	SIL		7.7	12.5

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

VIT.R ONTARIO 1985 PROFILE NO.MEFP009

LOCATION	City of St. Catharines, Lot 3, Con. II, NTS Map Area 30M/3f, 17 TPT 3908 8113
ELEVATION	95 metres
SITE	Rhubarb field
LANDFORM AND PARENT MATERIALS	Nearly level to very gently sloping glaciolacustrine plain overlain by reddish-hued loamy and sandy sediments
SLOPE	1% simple
SOIL WATER REGIME	Imperfectly drained, conductivity high in sands; medium to low in underlying sediments, saturation period medium
STONINESS	Nonstony
CLASSIFICATION	Gleyed Brunisolic Gray Brown Luvisol, sandy/loamy, alkaline, strongly calcareous, mild humid to subhumid
STATUS	Modal. C horizon has higher silt content than normal

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-35 (33-35)	10YR3/2m	SL	moderate, medium, granular	moderate, medium, granular	nonsticky, very friable, slightly plastic	
Bmgj1	35-46 (8-12)	10YR6/4m	LS	single grain		nonsticky, very friable, nonplastic	common, fine, distinct, 10YR5/6
Btgj	46-58 (10-14)	10YR5/4m	LS	massive		nonsticky, very friable, slightly plastic	common, fine, prominent, 10YR5/8
Bmgj2	58-90 (32-36)	10YR4/3m	FS	single grain		nonsticky, loose, nonplastic	common, fine, prominent, 10YR5/6
IICkg	90+	5YR5/2m	SI	massive		slightly sticky, very friable, slightly plastic	common, fine, prominent, 7.5YR5/6

			Sand Fraction %							
Horizon	Depth cm	Grav. >2 mm	VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0-35	0	0	3	30	33	9	75	18	7
Bmgj1	35-46	0	0	2	26	44	9	81	15	4
Btgj	46-58	0	1	3	26	42	8	80	11	9
Bmgj2	58-90	0	1	5	25	53	8	91	6	3
IICkg	90+	0						8	84	9

Horizon	Depth cm	Bulk Density g/cm³	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0-35	1.27	6.9	2.3	10.8			
Bmgj1	35-46	1.38	6.8	0.3	12.9			
Btgj	46-58	1.48	7.1	0.1	10.3			
Bmgj2	58-90	1.37	7.0	0.1	10.1	1.0		
IICkg	90+	1.51	7.6			10.0	1.6	0.2

WAINFLEET

WAINFLEET SOIL (WAF)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Organic soil, fen-associated, greater than 160 cm deep

DRAINAGE Very poor

USUAL CLASSIFICATION Mesic Fibrisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Peat Material and Texture	Stage of Decomposition	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Om1	1	22						woody fen peat	mesic	76.8	3.5	
Of1	1	54						woody fen sedge	fibric	90.5	3.7	
Of2	1	89						woody sedge fen peat	fibric	89.4	4.9	
Om2	1	121						woody sedge fen peat	mesic	89.1	5.2	
Om3	1	162						woody sedge fen peat	mesic	87.5	5.4	
IIBg	1		0	15	13	56	29	SICL		1.0	6.4	

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

WAF ONTARIO 1985 PROFILE NO. LWS21

LOCATION Township of Wainfleet, Lot 3, Con. III, NTS Map Area 30L/14f, 17 TPT 3903 5362

ELEVATION 177 metres

SITE Wainfleet Marsh, mainly alder and woody shrubs with some birch and poplar

LANDFORM AND PARENT MATERIALS Horizontal fen with organic sediments consisting of woody fen peat. Loamy mineral sediment occurs at 162 cm depth

SLOPE 0.5 % simple

SOIL WATER REGIME Very poorly drained, conductivity high, saturation period prolonged

STONINESS Nonstony

CLASSIFICATION Mesic Fibrisol, mesic, euic, mild, peraquic

STATUS Undecided

MORPHOLOGICAL DESCRIPTION, CHEMICAL AND PHYSICAL ANALYSES

Horizon	Depth cm	Colour (moist)	Peat Material and Texture	Stage of Decomposition	von Post Scale	Woody Material Volume %	Organic Matter %	pH $CaCl_2$	$CaCO_3$ %
Om1	0-22	5YR2.5/1	woody fen peat	mesic	5	10-20	76.8	3.5	
Of1	22-54	5YR3/3	woody fen peat	fibric	3	10-20	90.5	3.7	
Of2	54-89	10YR2/2	woody sedge fen peat	fibric	3	10-20	89.4	4.9	
Om2	89-121	10YR2/1	woody sedge fen peat	mesic	5	<10	89.1	5.2	
Om3	121-162	10YR2/1	woody sedge fen peat	mesic	5	<10	87.5	5.4	
IIBg	162+	5Y5/1	SICL				1.0	6.4	

WALSHER SOIL (WSH)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over lacustrine silt loam

DRAINAGE Well

USUAL CLASSIFICATION Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	6	18	5	63	31	28	9	VFSL	2.1	5.7	
Bm1	7	45	5	68	32	25	7	VFSL	0.7	5.7	
Bt	2	63	1	64	30	23	13	VFSL	0.5	6.6	
Bm2	6	77	6	64	22	29	7	FSL	0.3	5.7	
IIBm	4		2	34	22	51	15	SIL	0.2	5.8	

WALSINGHAM SOIL (WAM)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mostly eolian fine sand at least 1 m thick

DRAINAGE Imperfect

USUAL CLASSIFICATION Gleyed Brunisolic Gray Brown Luvisol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	1	23	0	83	40	11	6	VFSL	2.8	6.3	
Bmgj	2	37	0	90	28	7	3	FS	1.1	7.0	3.5
Btgj	1	73	0	80	46	10	10	LFS	0.2	6.5	0.0
Ckgj	4		0	85	14	10	5	LFS	0.1	7.3	12.5

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

WAM ONTARIO 1985 PROFILE NO.MEFP001

LOCATION Township of Wainfleet, Lot 2, Con. I, NTS Map Area 30L/14f, 17 TPT 3994 4824

ELEVATION 177 metres

SITE Abandoned farmland

LANDFORM AND PARENT MATERIALS Level to nearly level lacustrine clay plain overlain by variable depths of dominantly eolian sands

SLOPE 1% simple

SOIL WATER REGIME Imperfectly drained, conductivity high, saturation period medium

STONINESS Nonstony

CLASSIFICATION Gleyed Melanic Brunisol, sandy, neutral, weakly calcareous, mild humid to subhumid

STATUS Taxadjunct to Gleyed Brunisolic Gray Brown Luvisol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-25 (21-28)	10YR3/2m	FS	weak to moderate, fine, granular	weak, fine, granular	nonsticky, very friable,nonplastic	
Bmgj1	25-40 (11-15)	10YR4/6m	FS	single grain		nonsticky, very friable, nonplastic	common, fine, distinct, 10YR5/6
Bmgj2	40-56 (13-15)	10YR5/4m	S	single grain		nonsticky, loose, nonplastic	common, fine, distinct, 10YR4/6
Bmgj3	56-76 (14-22)	10YR5/3m	S	single grain		nonsticky, loose, nonplastic	many, fine, distinct, 7.5YR6/8
Bmgj4	76-93	10YR5/3m	S	single grain		nonsticky, loose, nonplastic	common, medium, distinct, 7.5YR5/6
Ckg	93+	10YR5/2m	S	massive	massive	nonsticky, loose, nonplastic	common, medium, prominent, 10YR6/6

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %
Ap	0-25	0	1	6	5	75	9	94	3	3
Bmgj1	25-40	0	0	1	36	58	2	96	3	1
Bmgj2	40-56	0	0	1	42	48	6	97	2	1
Bmgj3	56-76	1	1	2	44	48	2	97	2	1
Bmgj4	76-93	1	0	2	50	34	12	97	2	1
Ckg	93+	1	0	1	41	49	1	93	5	2

Horizon	Depth cm	Bulk Density g/cm^3	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio	Elec. Cond. mmhos/cm
Ap	0-25	1.12	5.6	4.6	14.2			
Bmgj1	25-40	1.26	6.8	1.2	8.9			
Bmgj2	40-56	1.40	6.5	0.6	8.2			
Bmgj3	56-76	1.45	6.6	0.3	8.3			
Bmgj4	76-93	1.57	6.8	0.1	9.6			
Ckg	93+	1.75	7.4			6.0	0.3	0.1

WAUSEON

WAUSEON SOIL (WUS)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm sandy textures over lacustrine silty clay

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	4	16	3	58	20	26	16	FSL	3.4	6.2	0.3
Bmgj	5	41	3	77	27	14	9	FSL	0.8	6.5	0.0
IIBtg	2	68	1	8	0	42	50	SIC	0.5	7.1	0.6
IICkg	6		1	5	1	43	52	SIC		7.7	14.9

WAUSEON SOIL - TILL PHASE (WUS.T)*

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 40 to 100 cm loamy textures over clay loam till

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	3	23	1	42	14	37	21	L	4.3	6.5	
Bg	3	47	4	56	14	26	18	FSL	0.4	6.4	
Btg	1	60	1	57	13	20	23	SCL	0.2	6.9	
IICkg	2		4	40	25	27	33	CL		7.6	11.8

* although there are local occurences of this soil, the areas were too small to map and therefore do not appear on the soil maps

WELLAND SOIL (WLL)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS Mainly reddish-hued lacustrine heavy clay

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	61	16	1	12	3	40	48	SIC	5.9	6.0	0.6
Bg1	63	39	0	7	2	32	61	HC	1.4	6.3	0.7
Bg2	21	56	0	8	2	30	62	HC	0.9	6.3	0.5
Ckg	56		0	3	0	31	66	HC	0.2	7.6	12.6

DETAILED PROFILE DESCRIPTIONS AND ANALYSES

WLL ONTARIO 1985 PROFILE NO.MEFSP011

LOCATION Town of Fort Erie, Lot 17, Con. XIII, NTS Map Area 30L/14h, 17 TPT 5650 5841

ELEVATION 180 metres

SITE Abandoned farmland

LANDFORM AND PARENT MATERIALS Level lacustrine clay plain composed dominantly of reddish, heavy clay sediments

SLOPE 0.5% simple

SOIL WATER REGIME Poorly drained, conductivity low, saturation period long to prolonged

STONINESS Nonstony

CLASSIFICATION Humic Luvic Gleysol, very fine clayey, alkaline, strongly calcareous, mild humid to subhumid

STATUS Taxadjunct to Orthic Humic Gleysol

Horizon	Depth (range) cm	Colour moist dry	Texture	Primary Structure	Secondary Structure	Consistence	Mottles
Ap	0-15 (14-16)	10YR4/2m	SIC	moderate, coarse, granular	moderate, coarse, granular	slightly sticky, friable, plastic	
Btg1	15-34 (16-20)	7.5YR4/2m	HC	very weak, coarse, subangular blocky	massive	sticky, very firm, very plastic	common, fine, prominent, 7.5YR5/6
Btg2	34-43 (8-10)	7.5YR5/2m	HC	weak, coarse, columnar	massive	sticky, very firm, very plastic	common, fine, prominent, 7.5YR5/5
Ckg	43+	7.5YR5/2m	HC	weak, coarse, columnar	weak, coarse, columnar	sticky, very firm, very plastic	common, fine, prominent, 7.5YR5/6

Horizon	Depth cm	Grav. >2 mm	Sand Fraction % VCS 2-1 mm	CS 1-.5 mm	MS .5-.25 mm	FS .25-.1 mm	VFS .1-.05 mm	Sand %	Silt %	Clay %	Fine Clay <.2um %	Bulk Density g/cm^3	Porosity %
Ap	0- 15	0						7	45	48	19	1.16	55
Btg1	15- 34	0						3	28	69	30	1.40	47
Btg2	34- 43	0						1	22	77	29	1.42	47
Ckg	43+	0						1	26	73	21	1.42	47

Horizon	Depth cm	% Moisture Retention (g/g) 0 kPa	5 kPa	33 kPa	1500 kPa	Available Moisture %	Hydr. Cond. cm/hr	Elec. Cond. mmhos/cm	pH H_2O	pH $CaCl_2$	Organic Matter %	CEC me/100g	$CaCO_3$ %	Cal/Dol Ratio
Ap	0- 15	67.0	44.0	38.0	20.0	18.0	9.00		5.9	5.2	4.2	16.8		
Btg1	15- 34	61.7	55.3	50.7	30.7	20.0	0.13		6.7	6.5	1.1	28.9		
Btg2	34- 43	63.3	57.7	52.3	36.0	16.3			7.4	7.3	1.0	30.9	1.0	
Ckg	43+	59.0	52.3	47.7	34.7	13.0	0.10	0.6	7.8	7.7			11.0	3.0

WELLAND SOIL - LOAMY PHASE (WLL.L)

GENERALIZED PROFILE CHARACTERISTICS

PARENT MATERIALS 15 to 40 cm loamy textures over reddish-hued lacustrine heavy clay

DRAINAGE Poor

USUAL CLASSIFICATION Orthic Humic Gleysol

MEAN HORIZON VALUES

Horizon	No. of Samples	Depth to Horizon Base (cm)	Gravel %	Sand %	VF Sand %	Silt %	Clay %	Tex-ture	Organic Matter %	pH in $CaCl_2$	$CaCO_3$ %
Ap	17	19	0	23	12	46	31	CL	4.6	6.0	0.2
IIBg1	10	43	0	8	2	34	58	C	1.0	6.3	0.0
IIBg2	5	46	0	11	5	30	59	C	0.8	6.3	1.4
IICkg	16		0	5	1	32	63	HC	1.1	7.7	14.0

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